Missouri Department of Transportation and Highway Patrol Employees' Retirement System

Five-Year Experience Study

July 1, 1999 - June 30, 2004

Gabriel, Roeder, Smith & Company

Actuaries & Consultants

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March 29, 2005

The Retirement Board
Missouri Department of Transportation
and Highway Patrol Employees' Retirement System
Jefferson City, Missouri

Ladies and Gentlemen:

Presented in this report are the results of an ***actuarial investigation of experience*** of the Missouri Department of Transportation and Highway Patrol Employees' Retirement System (MPERS). The investigation was conducted for the purpose of updating the actuarial assumptions used in valuing MPERS actuarial liabilities and establishing employer contribution rates.

The investigation was based upon the member data furnished for annual actuarial valuations during the period ***July 1, 1999 to June 30, 2004***.

The report presents specific recommendations with respect to non-economic assumptions and presents a range of potential choices for the economic assumptions. Non-economic activities (rates of turnover, retirement, etc.) tend to be generally stable and are subject to measurement by the actuary. Economic activities (inflation, investment return) tend to be unstable and are not really subject to direct measurement. We believe that the Board should select the economic assumptions from within ranges that the Board and the actuary deem reasonable.

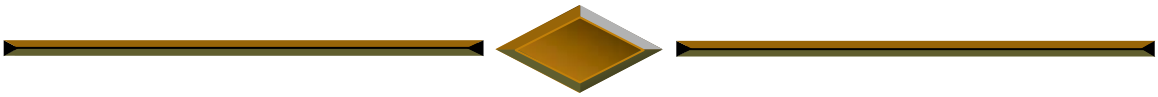
The investigation was carried out using generally accepted actuarial principles and techniques in accordance with standards of practice prescribed by the Actuarial Standards Board. We believe that the recommended actuarial assumptions that are the result of this investigation form a reasonable basis for computing future contributions and measuring funding progress for the Missouri Department of Transportation and Highway Patrol Employees' Retirement System.

Respectfully submitted,

Brian B. Murphy, F.S.A., E.A. Kenneth G. Alberts

KGA:BBM:tb

SUMMARY OF FINDINGS



1999 - 2004 EXPERIENCE STUDY
INTRODUCTION

Each year, as of June 30, the liabilities of the Missouri Department of Transportation and Highway Patrol Employees' Retirement System are valued. In order to perform the valuation, assumptions must be made regarding the future experience of the system with regard to the following risk areas:

- Rates of **withdrawal** of active participants.
- Rates of **disability** among active participants.
- Patterns of **salary increases** to active participants.
- Rates of **retirement** among active participants.
- Rates of **mortality** among active participants, retirees, and beneficiaries.
- Long-term rates of **investment return** to be generated by the assets of the Fund.

Assumptions should be carefully chosen and continually monitored. A poor initial choice of assumptions or continued use of outdated assumptions can lead to:

- Understated costs resulting in either an inability to pay benefits when due, or sharp increases in required contributions at some point in the future;

- Overstated costs resulting in either benefit levels that are kept below the level that could be supported by the computed rate or an unnecessarily large burden on the current generation of participants, employers and taxpayers.

A single set of assumptions will not be suitable indefinitely. Conditions change, and our understanding of conditions (whether or not they are changing) also changes.

In recognition of this, Missouri statutes require that assumptions used to value the liabilities of the Missouri Department of Transportation and Highway Patrol Employees' Retirement System be studied in-depth every five years. The package of assumptions is then adjusted to reflect basic experience trends -- but not random year-to-year fluctuations. Actuarial assumptions were last revised following the June 30, 1999 regular actuarial valuation.

1999 - 2004 EXPERIENCE STUDY
SUMMARY OF DECREMENT EXPERIENCE

Background: In general, recent patterns of non-economic activity (rates of withdrawal, disability, death, retirement, and merit and seniority pay increases) tend to be reliable predictors of future experience. However, past activity will also contain anomalies (or special circumstances) that cannot be assumed to replicate in the future. The actuary attempts to identify and remove these anomalies before creating recommended rates. The goal is to identify long-term trends in activity and move the rates toward those trends as a result of the periodic investigations. In establishing our recommendations, we have considered the results of the prior study, as well as the observed trends from this study.

Experience was studied separately for Uniformed members and Non-Uniformed members. For the Non-Uniformed members, the experience was further broken down between male and female members. Male and female experience was studied in aggregate for the Uniformed group since it is over 95% male.

Rates of Withdrawals: Withdrawals from service were studied separately for members with less than five years of service and members with five or more years of service. Actual rates of separation from employment for all member groups in both categories were above assumed rates. The recommended rates represent approximately a 50% increase in assumed rates for Uniformed members and a 10% to 15% increase in assumed rates for Non-Uniformed members.

Disability: Observed rates of disability are lower than assumed in all groups except Non-Uniformed males. The recommended rates reduce the assumption to more closely track experience. The recommendation for Non-Uniformed males is a continuation of the current assumption.

Normal Retirement: In 2002, a back DROP provision was added to this plan. It was estimated that the provision would have the effect of delaying retirement. This estimate was achieved by modifying the probabilities of retirement based on years since first eligible to retire with unreduced benefits. We studied retirement experience for the two valuation years that the provision was in effect and found no significant variation from the patterns of retirement emanating from the full five-year period. We believe that the long-term effects of the back DROP provision have yet to materialize in retirement experience.

1999 - 2004 EXPERIENCE STUDY
SUMMARY OF DECREMENT EXPERIENCE (CONCLUDED)

Normal Retirement (continued): Therefore, we developed initial rates based on an analysis of experience and then reduced most of those rates prior to age 62 to account for the anticipated effects of the back DROP provision. The result is a pattern of rates based strictly on age. Overall, however, rates were increased from the current assumption, particularly at the later ages.

Early Retirement: Experience indicated slightly less early retirements than assumed at most ages and significantly more at age 62 for males and ages 62 and higher for females. The recommended rates were adjusted accordingly.

Mortality: Mortality rates for both active and retired MPERS members suggest that the current mortality table remains reasonable. While the study shows that expected deaths slightly exceeded actual deaths for retired members (original annuitants), the valuation results over the study period have indicated a small mortality gain. This gain likely resulted from survivor experience (which was excluded from the study). In addition, the most recent experience study for MOSERS indicates that the current table continues to be reasonable for their members and includes a margin for mortality improvement. It is not expected that MPERS members would experience mortality at a slower rate than MOSERS members and the MOSERS population is a much larger group. Mortality experience of larger groups is more credible than the experience of smaller groups. We therefore recommend no change in the mortality rate assumptions.

Pay Increase Rate (Merit and Longevity Portion) was analyzed to see if the correlation with service was stronger than the correlation with age. For MPERS members during the study period, however, the correlation was stronger by age than by service. Therefore, we recommend continuing to associate assumed pay increases with age. Rates were adjusted for experience. Overall, these adjustments were small. The largest adjustments were made at the youngest ages.

Complete listings of all assumptions begin on page 34.

SUMMARY OF DECREMENT EXPERIENCE
1999-2004

Decrement Risk Area	Actual	Expected	
		Current	Proposed
Withdrawal - Total			
Uniform	144	75	112
Non-Uniform			
Male	1,817	1,239	1,450
Female	624	461	510
Withdrawal - Service 5 & Up			
Uniform	96	45	66
Non-Uniform			
Male	420	291	327
Female	248	203	221
Disability			
Uniform	2	6	3
Non-Uniform			
Male	48	64	64
Female	17	27	24
Early Retirement			
Non-Uniform			
Male	27	71	43
Female	22	21	22
Normal Retirement			
Uniform	130	112	110
Non-Uniform			
Male	1,225	647	822
Female	125	104	110
Mortality - Retired Lives			
Healthy Lives			
Male	645	671	671
Female	19	25	25
Mortality - Active Lives			
Male	43	47	47
Female	-	7	7

DATA RECONCILIATION
1999-2004

Uniformed Members

Year	Active Members Beginning of Year	Retired	Disabled	Died	Vested Terminated	Non-Vested Terminated	New	Active Members End of Year
1999	1,086	27			11	12	43	1,079
2000	1,079	20		1	27	8	54	1,077
2001	1,077	32	1	1	18	13	23	1,035
2002	1,035	27		1	16	3	85	1,073
2003	1,073	24	1		19	17	29	1,041
2004	1,041							
5-year	1,086	130	2	3	91	53	234	1,041

Non-Uniformed Members

Year	Active Members Beginning of Year	Retired	Disabled	Died	Vested Terminated	Non-Vested Terminated	New	Active Members End of Year
1999	8,054	292	10	10	133	415	898	8,092
2000	8,092	407	8	5	136	465	939	8,010
2001	8,010	235	17	13	121	422	458	7,660
2002	7,660	207	23	7	104	259	759	7,819
2003	7,819	258	7	5	82	304	798	7,961
2004	7,961							
5-year	8,054	1,399	65	40	576	1,865	3,852	7,961

ECONOMIC ASSUMPTIONS

Economic assumptions include **long-term rates of investment return** (net after expenses) and **wage inflation** (the across-the-board portion of salary increases). Unlike demographic activities, economic activities do not lend themselves to analysis solely on the basis of internal historical patterns because returns are more affected by external forces; namely inflation and general productivity changes which defy accurate long-term prediction. Estimates of economic activities are generally selected on the basis of the expectations in an inflation-free environment and then both are increased by some provision for long-term inflation.

If inflation and/or productivity increases are higher than expected, it will probably result in both actual rates of salary increases and investment return which exceed the assumed rates. Salaries increasing faster than expected produce unexpected liabilities. Investment return exceeding the assumed rates (whether due to manager performance, change in the mix of assets, or general market conditions) results in unanticipated assets. To the extent that inflation, productivity, and other factors have about the same effect on both sides of the balance sheet, these additional assets and liabilities can offset one another over the long-term.

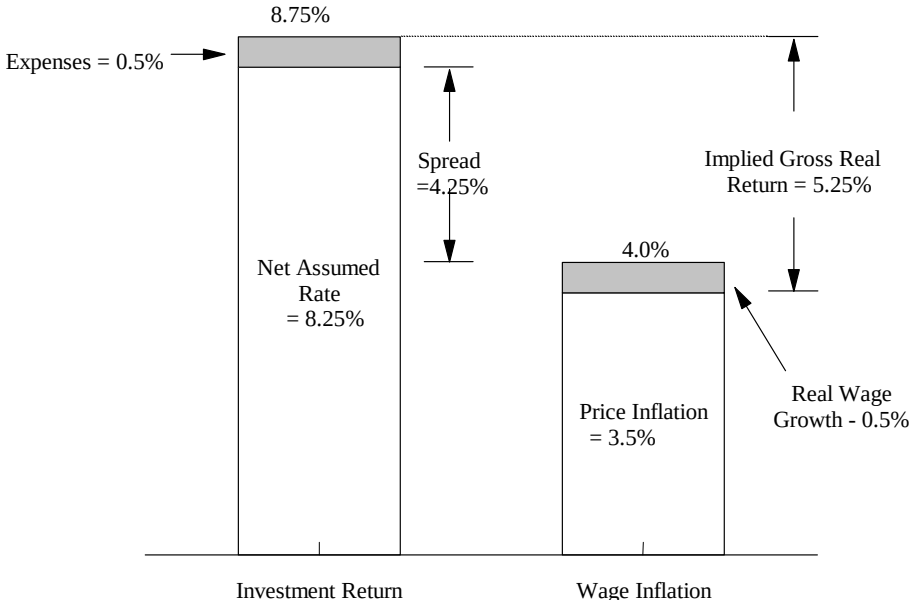
The present experience period includes investment results that are most unusual by long-term standards. While information from the present experience period may be considered in developing new assumptions, long-term historical patterns must necessarily play a much larger role.

Wage inflation. The average rate of increase in National Average Earnings over the last 55 years is higher than the current MPERS 4.0% assumption (see schedule on page 9). However, both regional and national average salaries have risen at a slower pace than 4.0% per year since 1999 (the MPERS average has been 2.2% annually and the national average has been 2.8%). The 10-year average increase is 4.0%, nationally and 2.9% for MPERS. We believe it is reasonable to assume that the average rate in the future will be between the MPERS experience and the national average experience of the last ten years. Therefore, we are demonstrating results based upon the current 4.00% wage inflation assumption and a 3.75% wage inflation assumption.

Investment Return. We believe that 8.25% continues to be reasonable. Staff has also indicated their comfort with this assumption. In reviewing historical rates of return, based on a sample portfolio with a similar asset allocation to MPERS, we see the 5, 10 and 55 year returns to be 3.7%, 11.3% and 9.8%, respectively. Whether the future will be more like the more distant past than the recent past cannot be known now. However, even prior to the 2000-2002 investment market disappointments, 8% was the most common interest rate assumption for governmental plans similar to MPERS. Therefore we are reviewing results based on both an 8.25% rate of return assumption and an 8.00% rate of return assumption.

Resulting Spread. The combination of 8.25% assumed return and 4.0% assumed rate of payroll growth results in an assumed "spread" of 4.25% (8.25% - 4.0% = 4.25%). Spreads for balanced portfolios have actually averaged 4.4% over the last 55 years (please see page 9), even including the poor investment experience in the early 2000s and periods of very high price and wage inflation in the late 1970s. We believe that an assumed spread of 4.0% to 4.5% is reasonable for MPERS.

The relationship between economic assumptions based on a 4.25% spread is illustrated below:



HISTORICAL PATTERNS OF INVESTMENT RETURN, PAY INCREASES & INFLATION

Calendar Year Period	Gross Market Returns: Bonds (Long) U.S. Treasury	Bonds (Long) Corp. (S&P AA)	Cash Equiv. (T Bills)	Stocks (S&P 500)	Price Inflation (CPI)	National Average Earnings	Sample Balanced Fund: Total Return (I)	Sample Balanced Fund: Spread: I - NAE - e
1950-59	(0.1)%	1.0 %	1.9 %	19.4 %	2.2 %	4.5 %	11.3 %	6.3 %
1960-69	1.4 %	1.7 %	3.9 %	7.8 %	2.5 %	4.3 %	5.4 %	0.6 %
1970-79	5.5 %	6.2 %	6.3 %	5.9 %	7.4 %	6.9 %	6.2 %	(1.2)%
1980-89	12.6 %	13.0 %	8.9 %	17.5 %	5.1 %	5.8 %	15.5 %	9.2 %
1990-99	8.8 %	8.4 %	4.9 %	18.2 %	2.9 %	4.2 %	13.9 %	9.2 %
2000	21.5 %	12.9 %	5.9 %	(9.1)%	3.4 %	5.5 %	2.2 %	(3.8)%
2001	3.7 %	10.7 %	3.8 %	(11.9)%	1.6 %	2.4 %	(3.5)%	(6.4)%
2002	17.8 %	16.3 %	1.7 %	(22.1)%	2.4 %	1.0 %	(5.2)%	(6.7)%
2003	1.5 %	5.3 %	1.0 %	28.7 %	1.9 %	2.4 %	17.2 %	14.3 %
2004	8.5 %	8.7 %	1.2 %	10.9 %	3.9 %	2.9 %	9.5 %	6.1 %
Last 5 Years	**10.3 %**	**10.7 %**	**2.7 %**	**(2.3)%**	**2.6 %**	**2.8 %**	**3.7 %**	**0.4 %**
Last 10 Years	**9.8 %**	**9.5 %**	**3.9 %**	**12.1 %**	**2.5 %**	**4.0 %**	**11.3 %**	**6.8 %**
Last 55 Years	**6.0 %**	**6.4 %**	**4.9 %**	**12.1 %**	**3.9 %**	**4.9 %**	**9.8 %**	**4.4 %**

Sample Balanced Fund	
Equities	55%
Bonds - Government	20%
- Corporate	20%
Cash Equivalents	5%
	100%
Fund expenses(e)	0.50%

Historical Spread

Observed spread is very sensitive to the observation period, even over long periods, as illustrated below:

Observation Period	Spread
55 years	4.4%
45 years	3.6%
35 years	4.6%

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TABLE 4
SEVERANCE EXPERIENCE

COMPLETED SERVICE IN YEARS	NON-UNIFORMED MALES			FEMALES			UNIFORMED PATROL		
	Years Exposed	Expected Severances	Actual Severances	Years Exposed	Expected Severances	Actual Severances	Years Exposed	Expected Severances	Actual Severances
0	3,333.1	1,133.25	947	505.8	156.80	144	175.1	7.00	6
1	2,588.5	501.52	373	364.8	113.09	101	184.3	7.37	7
2	2,343.6	313.46	278	268.3	57.42	41	230.2	9.21	11
3	2,177.7	204.16	233	220.4	47.17	36	257.3	6.05	15
4	2,030.9	139.62	164	186.3	39.87	27	283.6	11.34	8
5	1,796.5	96.56	104	154.3	33.02	25	299.3	11.97	9
6	1,618.0	70.79	69	115.5	21.02	12	260.6	9.12	7
7	1,461.7	52.99	55	84.3	12.65	3	201.8	6.05	0
8	1,365.9	40.98	43	72.8	6.26	6	163.5	4.09	6
9	1,263.5	31.59	31	58.0	3.13	4	126.4	2.53	3
10	1,223.4	26.00	24	43.8	1.66	4	92.2	1.57	1
11	1,140.5	21.38	28	35.4	1.06	1	91.7	1.38	3
12	1,116.1	18.14	16	32.2	.84	1	132.3	1.72	0
13	1,207.7	18.12	16	27.7	.66	0	116.6	1.40	1
14	1,258.2	17.30	15	19.5	.43	1	101.6	1.12	1
15	1,144.2	14.30	14	20.6	.41	1	111.6	1.12	2
16	1,138.5	14.23	26	16.6	.33	0	105.3	1.05	0
17	1,029.6	12.87	7	19.8	.40	1	71.0	.71	1
18	896.1	11.20	12	16.8	.34	1	81.6	.82	0
19	749.1	9.36	9	15.4	.31	0	80.3	.80	0
20-24	2,801.9	35.02	17	61.4	1.23	4	317.3	3.17	1
25-29	1,230.2	15.38	7	38.7	.77	1	201.4	2.01	1
30 & Over	422.4	5.28	0	36.1	.72	0	36.8	.37	0
ALL	35,337.3	2,803.50	2,488	2,414.5	499.59	414	3,721.8	96.21	83

SUMMARY OF VALUATION RESULTS

The table below describes hypothetical valuation results at June 30, 2004 with new and old decrement assumptions with indicated spreads. The rate changes are illustrative only since contribution rates have already been set based upon the actual June 30, 2004 valuation results.

Non-Uniformed Group	Present Assumptions	Proposed Decrement Assumptions, Asset Changes and Indicated Economic Assumptions		
		Present	Alt. 1	Alt. 2
Assumptions				
Investment Return	8.25 %	8.25 %	8.25 %	8.00 %
Wage Inflation	4.00 %	4.00 %	3.75 %	3.75 %
Investment Spread	4.25 %	4.25 %	4.50 %	4.25 %
Price Inflation	3.50 %	3.50 %	3.25 %	3.25 %
Contributions for				
Normal Cost	11.79 %	11.80 %	11.22 %	11.91 %
Unfunded Actuarial Accrued Liability	17.64 %	17.96 %	18.02 %	18.58 %
Disability Insurance	0.56 %	0.56 %	0.56 %	0.56 %
Administrative Expenses	0.50 %	0.50 %	0.50 %	0.50 %
Total Computed Employer Contribution	**30.49 %**	**30.82 %**	**30.30 %**	**31.55 %**

Uniformed Group	Present Assumptions	Proposed Decrement Assumptions, Asset Changes and Indicated Economic Assumptions		
		Present	Alt. 1	Alt. 2
Assumptions				
Investment Return	8.25 %	8.25 %	8.25 %	8.00 %
Wage Inflation	4.00 %	4.00 %	3.75 %	3.75 %
Investment Spread	4.25 %	4.25 %	4.50 %	4.25 %
Price Inflation	3.50 %	3.50 %	3.25 %	3.25 %
Contributions for				
Normal Cost	13.55 %	13.88 %	13.18 %	14.01 %
Unfunded Actuarial Accrued Liability	29.66 %	29.76 %	29.73 %	30.97 %
Disability Insurance	0.56 %	0.56 %	0.56 %	0.56 %
Administrative Expenses	0.50 %	0.50 %	0.50 %	0.50 %
Total Computed Employer Contribution	**44.27 %**	**44.70 %**	**43.97 %**	**46.04 %**

MPERS	Present Assumptions	Proposed Decrement Assumptions, Asset Changes and Indicated Economic Assumptions		
		Present	Alt. 1	Alt. 2
Assumptions				
Investment Return	8.25 %	8.25 %	8.25 %	8.00 %
Wage Inflation	4.00 %	4.00 %	3.75 %	3.75 %
Investment Spread	4.25 %	4.25 %	4.50 %	4.25 %
Price Inflation	3.50 %	3.50 %	3.25 %	3.25 %
Funded Status	**53.4 %**	**53.4 %**	**54.2 %**	**52.7 %**

New assumptions will be first used in the June 30, 2005 actuarial valuations, at which time experience gains or losses incurred during 2004/2005 will also be recognized. Consequently, no rate changes are recommended at this time.

Load for unused sick leave: Currently Normal and Early retirement benefits are increased by 4.3% for Uniformed members and 2.6% for Non-Uniformed members to account for the inclusion of unused sick leave in the calculation of Average Pay. A review of the unused sick leave for active members currently eligible for retirement indicates the following:

Member Group	Number	Average Service	Average Unused Sick Leave*	Ratio
Uniformed	100	31.2 yrs	1.32 yrs	4.23%
MoDOT	631	27.4 yrs	0.74 yrs	2.70%
Civilian Patrol	139	26.3 yrs	0.72 yrs	2.74%

** Based on crediting 1 month of service for every 168 hours of unused sick leave.*

This review supports continued use of the current loads. We recommend that these loads be continued, unchanged.

Funding Value of Assets: As of June 30, 2004 the funding value of assets was 98.4% of the market value of assets. The difference was $21.3 million. Yet there are $26.2 million of past losses and $47.4 million of past gains scheduled to be recognized in the next two years. Investment return over the past few years has been particularly volatile. Given the proximity of the actuarial value of assets and the market value of assets to each other, we recommend setting the actuarial value equal to the market value and re-starting the smoothing process. This will result in an increase in the funding value of assets of $21.3 million as of July 1, 2004. We also recommend continuation of the current smoothing process, which would begin again with the investment return for the year ending June 30, 2005, with the addition of a 20% corridor. This corridor would limit the funding value of assets to the range of 80% of market value to 120% of market value.

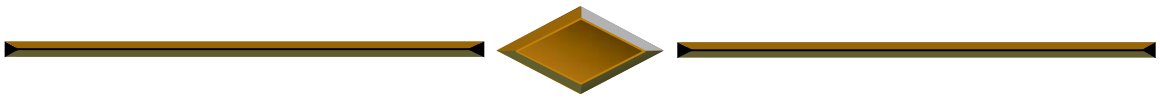
Optional forms of payment: Reduction factors for MSEP 2000 are codified in the statute and are probably slightly subsidized (compared to factors based on the recommended valuation interest and mortality assumptions). We recommend the addition of a load to account for this subsidy. Factors for MSEP are adopted by the Board. We reviewed these factors and find them to be actuarially equivalent within reasonable tolerances. The load for MSEP 2000 was determined by looking at the members who retired during the last five years and determining the following information:

- Average age at retirement and option elected;
- Average beneficiary age at retirement;
- Percent of members electing each type of option;
- Percent of males electing each type of option.

Based on this information, the actuarial equivalent option factor was developed for each Joint & Survivor option and compared with the statutory factor. This resulted in a recommended load of 1.5% for Uniformed members and 1.0% for Non-Uniformed members.

MSEP 2000 Load: The normal cost for the normal retirement decrement for Non-Uniformed members is loaded to account for anticipated changes in the pattern of retirements due to the year 2000 Plan. We believe that the changes are now evident in the experience and the newly recommended pattern. We therefore recommend discontinuation of this load.

WITHDRAWAL EXPERIENCE



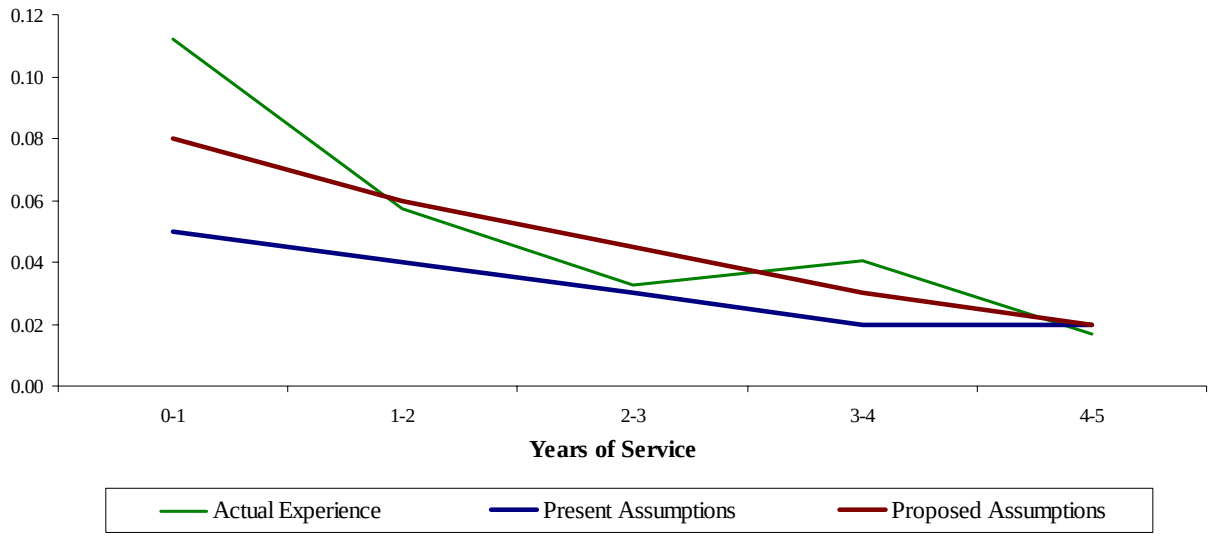
UNIFORMED MEMBERS
SERVICE-BASED WITHDRAWAL EXPERIENCE

There were 48 withdrawals and 1,009 years of exposure included in the service-based withdrawal investigation. Withdrawals are separations from active member status for a reason other than disability, death, or retirement.

WITHDRAWALS WITH LESS THAN 5 YEARS OF SERVICE

Years of Service	Life Years Exposure	Number of Withdrawals			Withdrawal Rates		
		Actual Experience	Expected			Expected	
			Present	Proposed	Actual	Present	Proposed
0-1	134	15	7	11	0.1119	0.0500	0.0800
1-2	209	12	8	13	0.0574	0.0400	0.0600
2-3	214	7	6	10	0.0327	0.0300	0.0450
3-4	273	11	5	8	0.0403	0.0200	0.0300
4-5	179	3	4	4	0.0168	0.0200	0.0200
Totals	**1,009**	**48**	**30**	**46**	**0.0476**	**0.0297**	**0.0456**

RATES OF WITHDRAWALS WITH LESS THAN 5 YEARS OF SERVICE



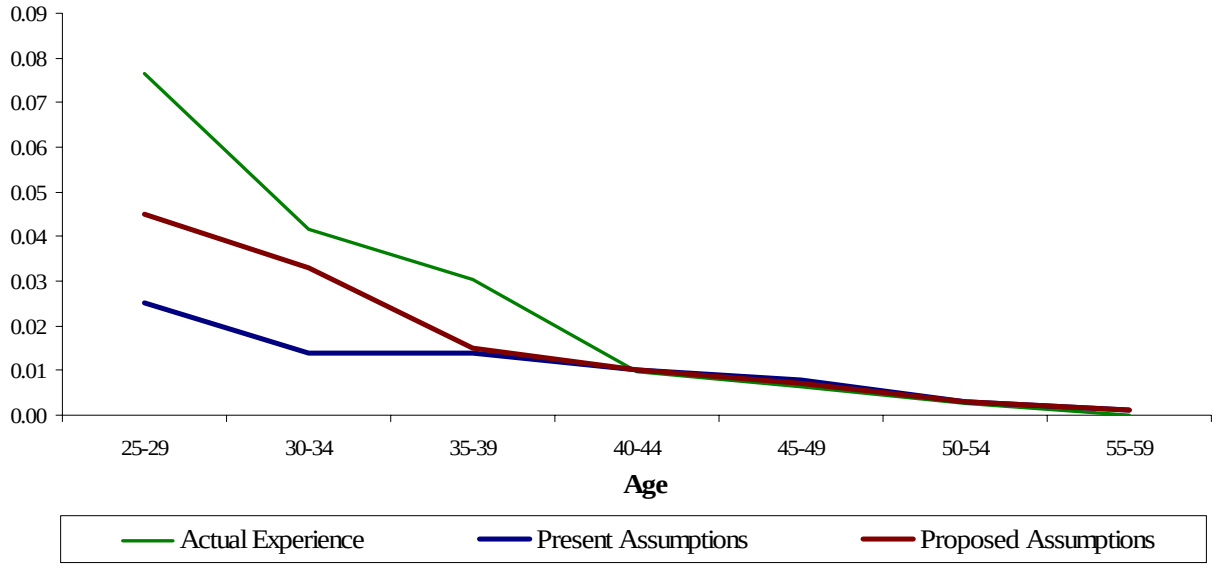
UNIFORMED MEMBERS
AGE-BASED WITHDRAWAL EXPERIENCE

There were 96 withdrawals and 3,927 years of exposure included in the age-based withdrawal investigation. Withdrawals are separations from active member status for a reason other than disability, death, or retirement.

WITHDRAWALS WITH 5 OR MORE YEARS OF SERVICE

Age	Life Years Exposure	Number of Withdrawals			Withdrawal Rates		
		Actual Experience	Expected			Expected	
			Present	Proposed	Actual	Present	Proposed
25-29	144	11	4	6	0.0764	0.0250	0.0450
30-34	1,012	42	14	33	0.0415	0.0140	0.0330
35-39	1,019	31	14	15	0.0304	0.0140	0.0150
40-44	710	7	7	7	0.0099	0.0100	0.0100
45-49	639	4	5	4	0.0063	0.0080	0.0070
50-54	393	1	1	1	0.0025	0.0030	0.0030
55-59	10	0	0	0	0.0000	0.0010	0.0010
Totals	**3,927**	**96**	**45**	**66**	**0.0244**	**0.0115**	**0.0168**

RATES OF WITHDRAWALS WITH 5 OR MORE YEARS OF SERVICE



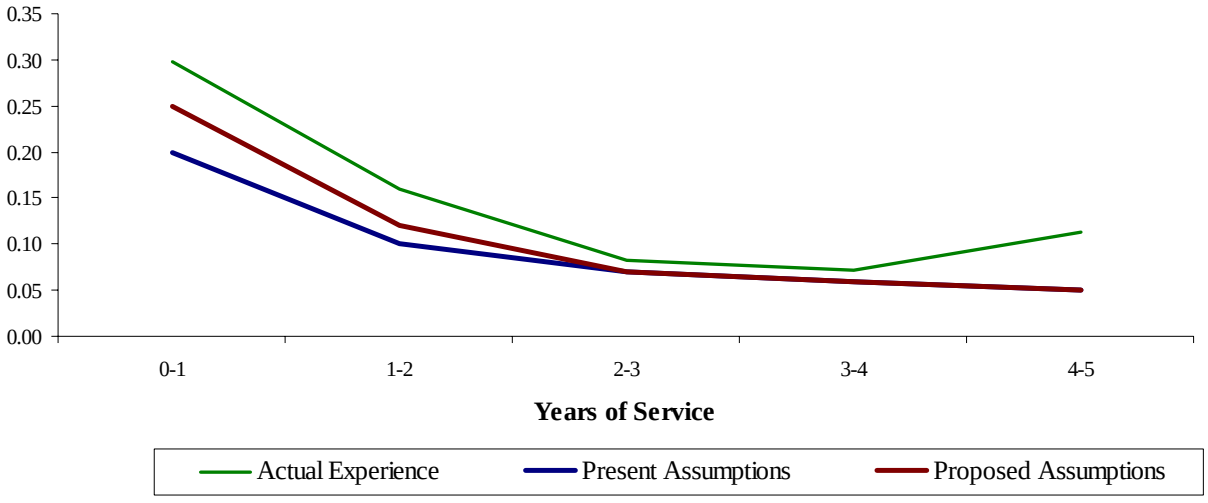
NON-UNIFORMED MALES
SERVICE-BASED WITHDRAWAL EXPERIENCE

There were 1,397 withdrawals and 8,048 years of exposure included in the male service-based withdrawal investigation. Withdrawals are separations from active member status for a reason other than disability, death, or retirement.

WITHDRAWALS WITH LESS THAN 5 YEARS OF SERVICE

Years of Service	Life Years Exposure	Number of Withdrawals			Withdrawal Rates		
		Actual Experience	Expected			Expected	
			Present	Proposed	Actual	Present	Proposed
0-1	2,691	800	538	673	0.2973	0.2000	0.2500
1-2	1,990	318	199	239	0.1598	0.1000	0.1200
2-3	1,379	113	97	97	0.0819	0.0700	0.0700
3-4	1,428	103	86	86	0.0721	0.0600	0.0600
4-5	560	63	28	28	0.1125	0.0500	0.0500
Totals	**8,048**	**1,397**	**948**	**1,123**	**0.1736**	**0.1178**	**0.1395**

RATES OF WITHDRAWALS WITH LESS THAN 5 YEARS OF SERVICE



NON-UNIFORMED MALES
AGE-BASED WITHDRAWAL EXPERIENCE

There were 420 withdrawals and 17,604 years of exposure included in the male age-based withdrawal investigation. Withdrawals are separations from active member status for a reason other than disability, death, or retirement.

WITHDRAWALS WITH 5 OR MORE YEARS OF SERVICE

Age	Life Years Exposure	Number of Withdrawals			Withdrawal Rates		
		Actual Experience	Expected			Expected	
			Present	Proposed	Actual	Present	Proposed
20-24	36	2	1	1	0.0556	0.0400	0.0470
25-29	772	41	30	36	0.0531	0.0390	0.0470
30-34	2,122	87	64	72	0.0410	0.0300	0.0340
35-39	3,055	96	67	76	0.0314	0.0220	0.0250
40-44	4,318	82	65	69	0.0190	0.0150	0.0160
45-49	4,357	54	48	48	0.0124	0.0110	0.0110
50-54	2,630	39	16	24	0.0148	0.0060	0.0090
55-59	228	14	0	1	0.0614	0.0020	0.0050
60 & Up	86	5	0	0	0.0581	0.0000	0.0001
Totals	**17,604**	**420**	**291**	**327**	**0.0239**	**0.0165**	**0.0186**

RATES OF WITHDRAWALS WITH 5 OR MORE YEARS OF SERVICE

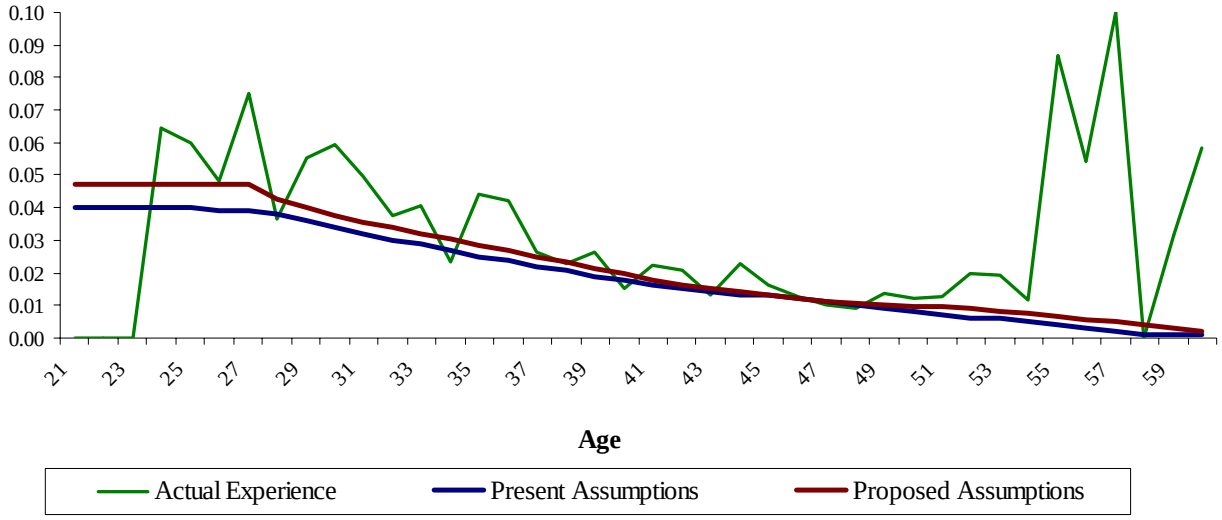


TABLE 5
PENSIONER MORTALITY

AGES	NON-UNIFORMED MALES Years Exposed To Risk	Expected Deaths	Actual Deaths	FEMALES Years Exposed To Risk	Expected Deaths	Actual Deaths	UNIFORMED PATROL Years Exposed To Risk	Expected Deaths	Actual Deaths	AGES
- 51	92.1	5.41	10	0.0	0.00	0	5.0	0.48	0	- 51
52 - 54	52.6	3.59	3	0.5	0.02	0	0.0	0.00	0	52 - 54
55 - 57	93.6	5.94	4	3.0	0.14	1	17.2	1.64	1	55 - 57
58 - 60	131.8	9.16	9	2.8	0.13	0	82.8	3.09	1	58 - 60
61 - 63	429.9	33.51	18	8.3	0.39	0	135.7	2.46	2	61 - 63
64 - 66	893.6	25.44	25	16.0	0.30	0	93.0	2.13	2	64 - 66
67 - 69	1,065.0	37.51	28	47.9	0.81	0	49.2	1.43	1	67 - 69
70 - 72	972.5	41.88	51	52.0	1.21	0	15.6	0.59	1	70 - 72
73 - 75	625.0	32.46	30	57.3	1.86	0	8.3	0.41	2	73 - 75
76 - 78	417.5	26.98	35	36.5	1.60	0	.3	.02	0	76 - 78
79 - 81	267.1	25.78	21	9.1	0.53	1	0.0	0.00	0	79 - 81
82 - 84	156.0	19.30	23	1.3	0.10	0	0.0	0.00	0	82 - 84
85 - 87	50.2	8.06	6	2.9	0.34	0	0.0	0.00	0	85 - 87
88 - 90	19.8	4.19	1	2.1	0.32	0	0.0	0.00	0	88 - 90
91 & Over	14.2	3.84	3	0.0	0.00	0	0.0	0.00	0	91 & Over
ALL	5,280.9	283.05	267	239.7	7.75	2	407.1	12.25	10	

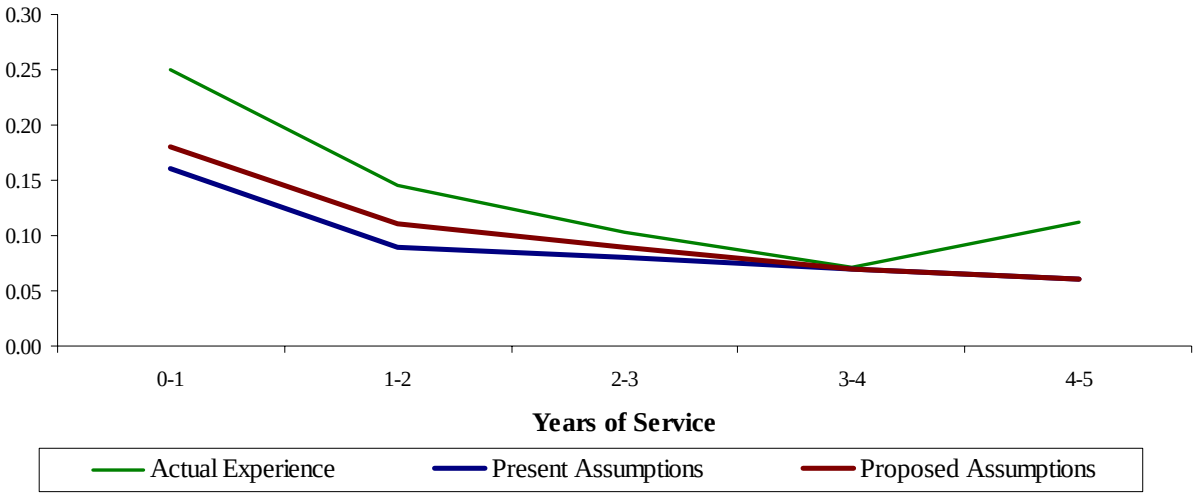
NON-UNIFORMED FEMALES
SERVICE-BASED WITHDRAWAL EXPERIENCE

There were 376 withdrawals and 2,675 years of exposure included in the female service-based withdrawal investigation. Withdrawals are separations from active member status for a reason other than disability, death, or retirement.

WITHDRAWALS WITH LESS THAN 5 YEARS OF SERVICE

Years of Service	Life Years Exposure	Number of Withdrawals			Withdrawal Rates		
		Actual Experience	Expected			Expected	
			Present	Proposed	Actual	Present	Proposed
0-1	596	149	95	107	0.2500	0.1600	0.1800
1-2	689	100	62	76	0.1451	0.0900	0.1100
2-3	560	58	45	50	0.1036	0.0800	0.0900
3-4	581	41	41	41	0.0706	0.0700	0.0700
4-5	249	28	15	15	0.1124	0.0600	0.0600
Totals	**2,675**	**376**	**258**	**289**	**0.1406**	**0.0964**	**0.1080**

RATES OF WITHDRAWALS WITH LESS THAN 5 YEARS OF SERVICE



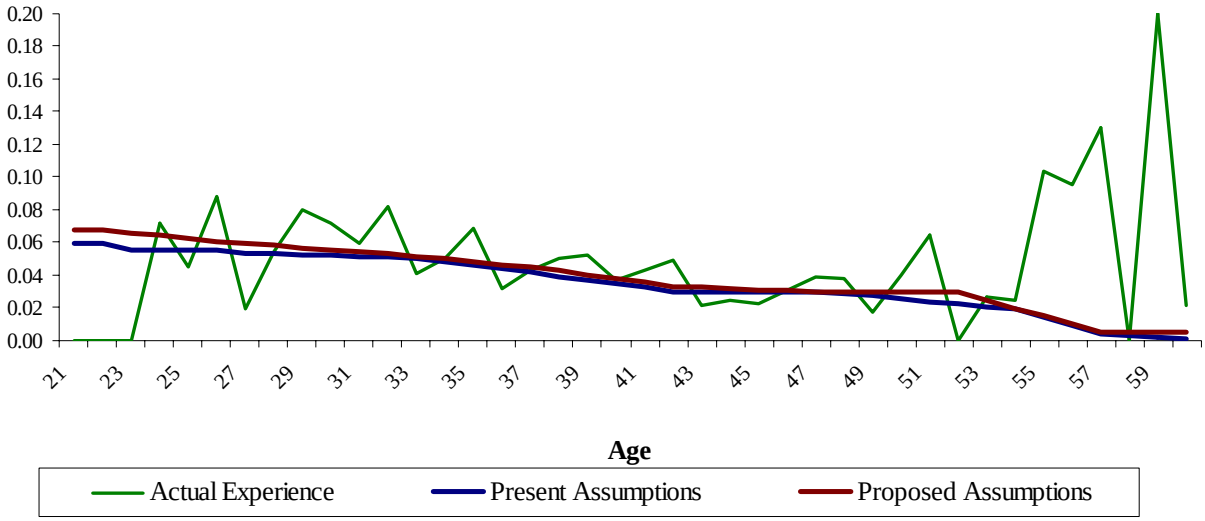
NON-UNIFORMED FEMALES
AGE-BASED WITHDRAWAL EXPERIENCE

There were 248 withdrawals and 5,860 years of exposure included in the female age-based withdrawal investigation. Withdrawals are separations from active member status for a reason other than disability, death, or retirement.

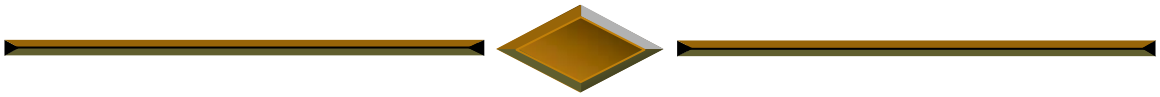
WITHDRAWALS WITH 5 OR MORE YEARS OF SERVICE

Age	Life Years Exposure	Number of Withdrawals			Withdrawal Rates		
		Actual Experience	Expected			Expected	
			Present	Proposed	Actual	Present	Proposed
20-24	20	1	1	1	0.0500	0.0600	0.0674
25-29	311	19	16	18	0.0611	0.0530	0.0593
30-34	789	47	40	42	0.0596	0.0510	0.0530
35-39	1,157	57	49	52	0.0493	0.0420	0.0450
40-44	1,392	49	42	46	0.0352	0.0300	0.0330
45-49	1,248	37	37	37	0.0296	0.0300	0.0300
50-54	788	26	18	24	0.0330	0.0230	0.0300
55-59	108	11	0	1	0.1019	0.0040	0.0050
60 & Up	47	1	0	0	0.0213	0.0000	0.0050
Totals	**5,860**	**248**	**203**	**221**	**0.0423**	**0.0346**	**0.0377**

RATES OF WITHDRAWALS WITH 5 OR MORE YEARS OF SERVICE



DISABILITY EXPERIENCE



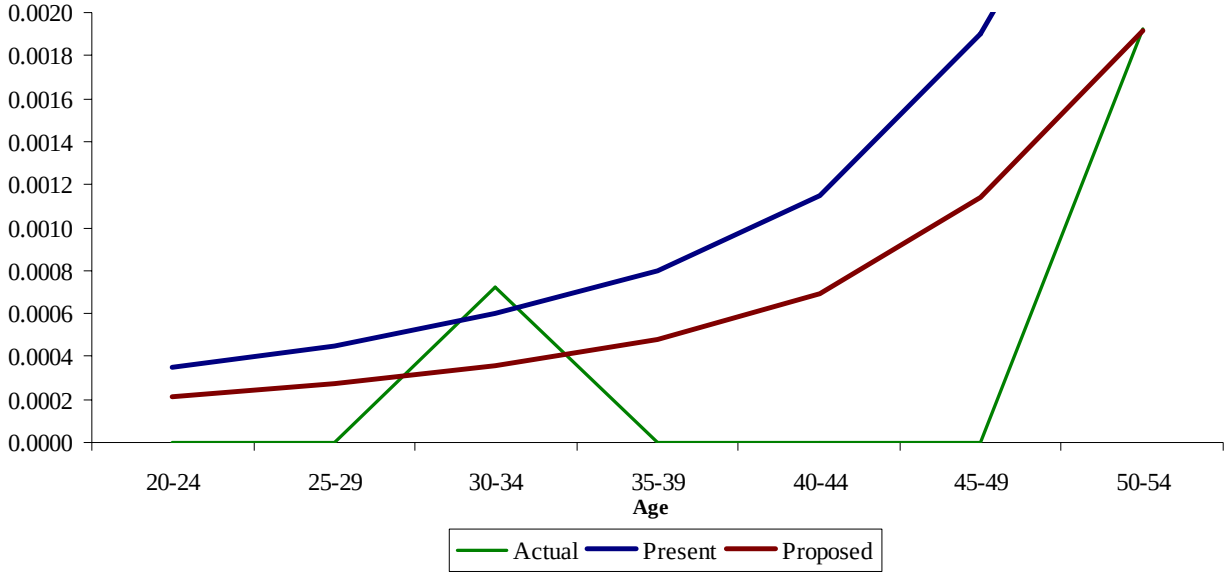
UNIFORMED MEMBERS
DISABILITY EXPERIENCE

There were 2 disability benefit claims reported for the 5-year period and 5,177 years of exposure.

DISABLED UNIFORMED MEMBERS

Age	Life Years Exposure	Number of Disabilities			Disability Rates		
		Actual Experience	Expected			Expected	
			Present	Proposed	Actual	Present	Proposed
20-24	124	0	0	0	0.0000	0.0003	0.0002
25-29	790	0	0	0	0.0000	0.0004	0.0003
30-34	1,389	1	1	1	0.0007	0.0006	0.0004
35-39	1,019	0	1	0	0.0000	0.0008	0.0005
40-44	694	0	1	0	0.0000	0.0012	0.0007
45-49	642	0	1	1	0.0000	0.0019	0.0011
50-54	519	1	2	1	0.0019	0.0032	0.0019
Totals	**5,177**	**2**	**6**	**3**	**0.0004**	**0.0012**	**0.0006**

RATES OF DISABLED UNIFORMED MEMBERS



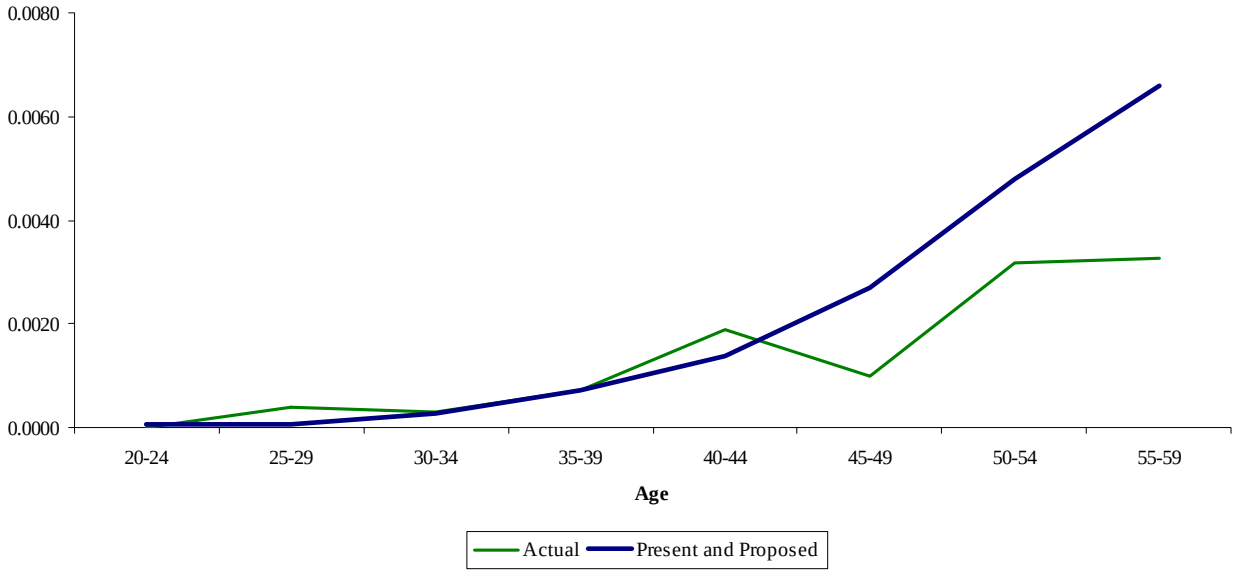
NON-UNIFORMED MALES
DISABILITY EXPERIENCE

There were 48 disability benefit claims reported for the 5-year period and 30,287 years of exposure.

DISABLED NON-UNIFORMED MALES

Age	Life Years Exposure	Number of Disabilities			Disability Rates		
		Actual Experience	Expected			Expected	
			Present	Proposed	Actual	Present	Proposed
20-24	1,134	0	0	0	0.0000	0.0001	0.0001
25-29	2,554	1	0	0	0.0004	0.0001	0.0001
30-34	3,429	1	1	1	0.0003	0.0003	0.0003
35-39	4,248	3	3	3	0.0007	0.0007	0.0007
40-44	5,333	10	7	7	0.0019	0.0014	0.0014
45-49	5,054	5	14	14	0.0010	0.0027	0.0027
50-54	4,409	14	21	21	0.0032	0.0048	0.0048
55-59	2,758	9	18	18	0.0033	0.0066	0.0066
60-64	1,219	5	0	0	0.0041	0.0000	0.0000
65-69	147	0	0	0	0.0000	0.0000	0.0000
70 & Up	2	0	0	0	0.0000	0.0000	0.0000
Totals	**30,287**	**48**	**64**	**64**	**0.0016**	**0.0021**	**0.0021**

RATES OF DISABLED NON-UNIFORMED MALES



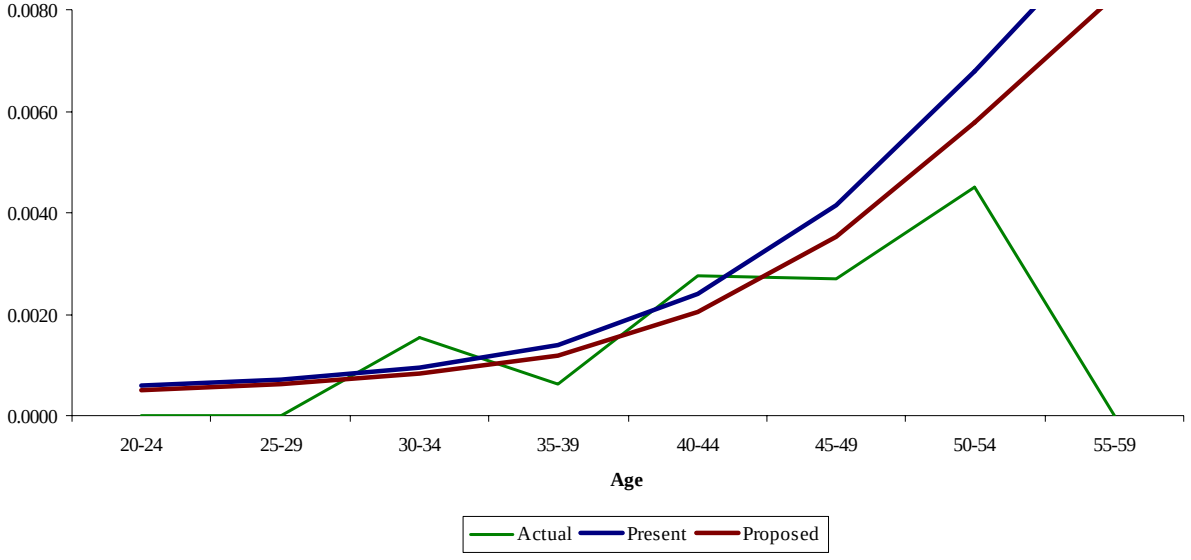
NON-UNIFORMED FEMALES
DISABILITY EXPERIENCE

There were 17 disability benefit claims reported for the 5-year period and 9,281 years of exposure.

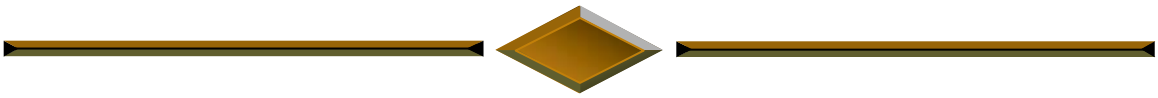
DISABLED NON-UNIFORMED FEMALES

Age	Life Years Exposure	Number of Disabilities			Disability Rates		
		Actual Experience	Expected			Expected	
			Present	Proposed	Actual	Present	Proposed
20-24	289	0	0	0	0.0000	0.0006	0.0005
25-29	838	0	1	1	0.0000	0.0007	0.0006
30-34	1,294	2	1	1	0.0015	0.0010	0.0008
35-39	1,617	1	2	2	0.0006	0.0014	0.0012
40-44	1,817	5	4	4	0.0028	0.0024	0.0020
45-49	1,481	4	6	5	0.0027	0.0041	0.0035
50-54	1,107	5	8	6	0.0045	0.0068	0.0058
55-59	555	0	5	5	0.0000	0.0097	0.0083
60-64	232	0	0	0	0.0000	0.0000	0.0000
65-69	50	0	0	0	0.0000	0.0000	0.0000
70& Up	1	0	0	0	0.0000	0.0000	0.0000
Totals	**9,281**	**17**	**27**	**24**	**0.0018**	**0.0029**	**0.0026**

RATES OF DISABLED NON-UNIFORMED FEMALES



NORMAL & EARLY RETIREMENT EXPERIENCE



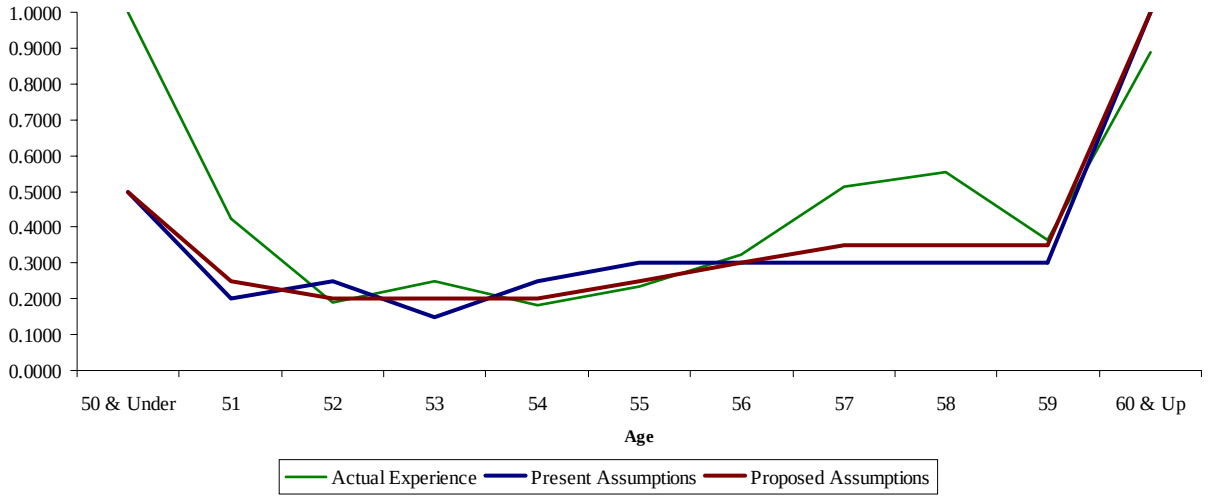
UNIFORMED MEMBERS
NORMAL RETIREMENT EXPERIENCE

There were 130 age and service unreduced retirements and 414 life years of exposure (exposure includes active members eligible for unreduced retirement) in the retirement investigation.

SUMMARY OF UNIFORMED AGE & SERVICE UNREDUCED RETIREMENT EXPERIENCE

Age	Life Years Exposure	Number of Retirements			Retirement Rates		
		Actual Experience	Expected			Expected	
			Present	Proposed	Actual	Present	Proposed
50 & Under	5	5	3	3	1.0000	0.5000	0.5000
51	40	17	8	10	0.4250	0.2000	0.2500
52	58	11	15	12	0.1897	0.2500	0.2000
53	72	18	11	14	0.2500	0.1500	0.2000
54	66	12	17	13	0.1818	0.2500	0.2000
55	60	14	18	15	0.2333	0.3000	0.2500
56	40	13	12	12	0.3250	0.3000	0.3000
57	35	18	11	12	0.5143	0.3000	0.3500
58	18	10	5	6	0.5556	0.3000	0.3500
59	11	4	3	4	0.3636	0.3000	0.3500
60 & Up	9	8	9	9	0.8889	1.0000	1.0000
Total	**414**	**130**	**112**	**110**	**0.3140**	**0.2705**	**0.2657**

RATES OF UNREDUCED RETIREMENT EXPERIENCE FOR UNIFORMED MEMBERS



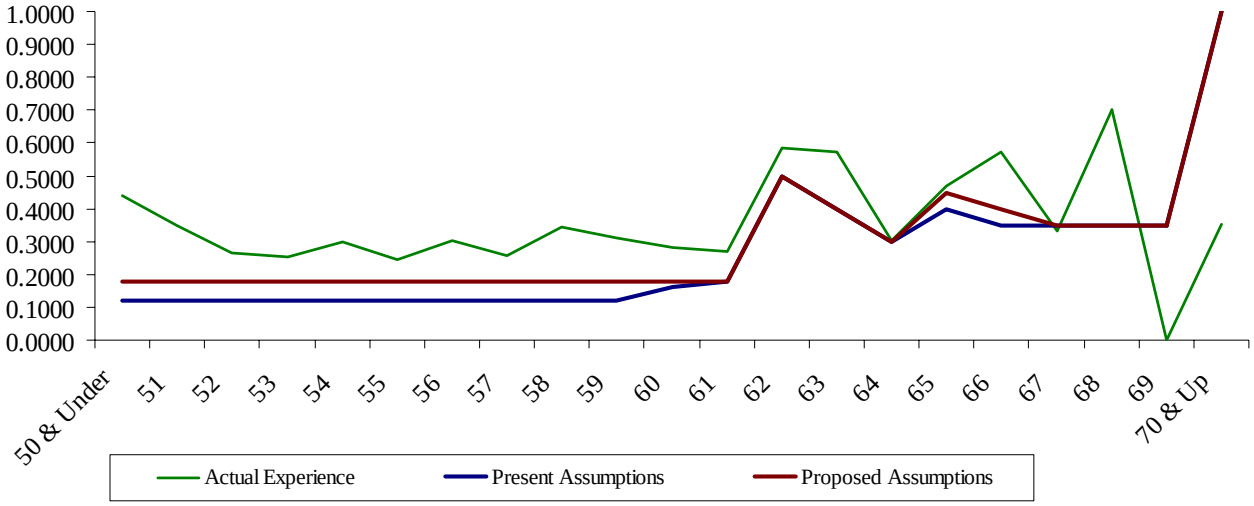
NON-UNIFORMED MALES
NORMAL RETIREMENT EXPERIENCE

There were 1,225 age and service unreduced retirements and 3,783 life years of exposure (exposure includes active members eligible for unreduced retirement) in the male retirement investigation.

SUMMARY OF NON-UNIFORMED MALES AGE & SERVICE UNREDUCED RETIREMENT EXPERIENCE

Age	Life Years Exposure	Number of Retirements			Retirement Rates		
		Actual Experience	Expected			Expected	
			Present	Proposed	Actual	Present	Proposed
50 & Under	120	53	14	22	0.4417	0.1200	0.1800
51	219	76	26	39	0.3470	0.1200	0.1800
52	271	72	33	49	0.2657	0.1200	0.1800
53	337	85	40	61	0.2522	0.1200	0.1800
54	338	101	41	61	0.2988	0.1200	0.1800
55	309	76	37	56	0.2460	0.1200	0.1800
56	315	95	38	57	0.3016	0.1200	0.1800
57	298	77	36	54	0.2584	0.1200	0.1800
58	285	98	34	51	0.3439	0.1200	0.1800
59	258	80	31	46	0.3101	0.1200	0.1800
60	285	81	46	51	0.2842	0.1600	0.1800
61	236	64	42	42	0.2712	0.1800	0.1800
62	221	129	111	111	0.5837	0.5000	0.5000
63	101	58	40	40	0.5743	0.4000	0.4000
64	56	17	17	17	0.3036	0.3000	0.3000
65	64	30	26	29	0.4688	0.4000	0.4500
66	28	16	10	11	0.5714	0.3500	0.4000
67	12	4	4	4	0.3333	0.3500	0.3500
68	10	7	3	3	0.7000	0.3500	0.3500
69	3	0	1	1	0.0000	0.3500	0.3500
70 & Up	17	6	17	17	0.3529	1.0000	1.0000
Total	**3,783**	**1,225**	**647**	**822**	**0.3238**	**0.1710**	**0.2173**

RATES OF UNREDUCED RETIREMENT EXPERIENCE FOR NON-UNIFORMED MALES



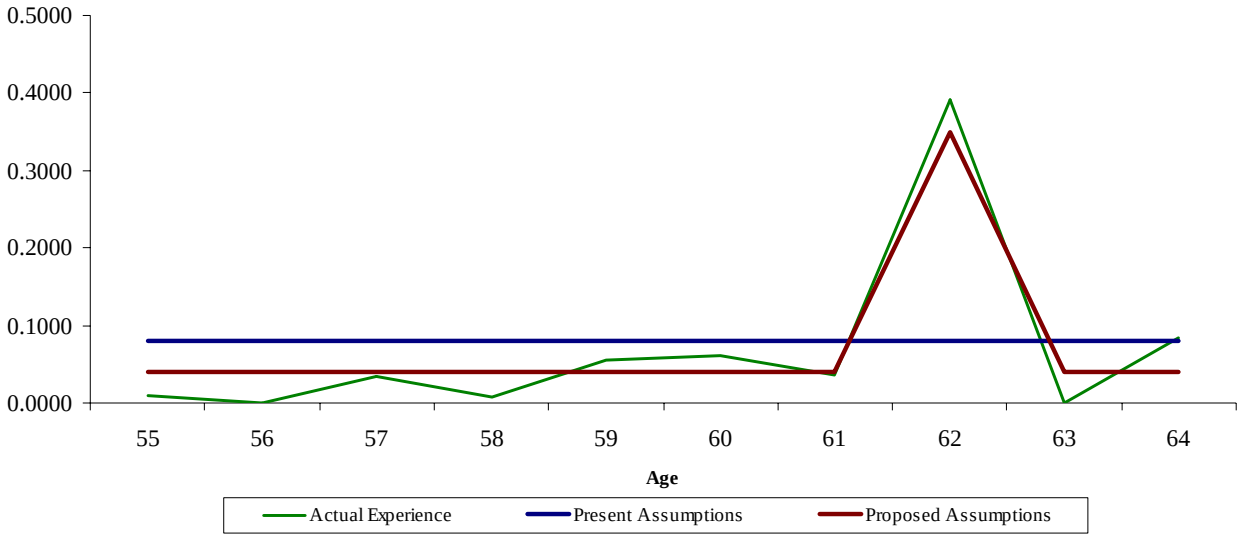
NON-UNIFORMED MALES
EARLY RETIREMENT EXPERIENCE

There were 27 age and service reduced retirements and 890 life years of exposure (exposure includes active members eligible for reduced retirement) in the male retirement investigation.

SUMMARY OF NON-UNIFORMED MALES AGE & SERVICE REDUCED RETIREMENT EXPERIENCE

Age	Life Years Exposure	Number of Retirements			Retirement Rates		
		Actual Experience	Expected			Expected	
			Present	Proposed	Actual	Present	Proposed
55	217	2	17.4	8.7	0.0092	0.0800	0.0400
56	182	0	14.6	7.3	0.0000	0.0800	0.0400
57	148	5	11.8	5.9	0.0338	0.0800	0.0400
58	123	1	9.8	4.9	0.0081	0.0800	0.0400
59	109	6	8.7	4.4	0.0550	0.0800	0.0400
60	33	2	2.6	1.3	0.0606	0.0800	0.0400
61	27	1	2.2	1.1	0.0370	0.0800	0.0400
62	23	9	1.8	8.0	0.3913	0.0800	0.3500
63	16	0	1.3	0.6	0.0000	0.0800	0.0400
64	12	1	1.0	0.5	0.0833	0.0800	0.0400
Total	**890**	**27**	**71.2**	**42.7**	**0.0303**	**0.0800**	**0.0480**

RATES OF REDUCED RETIREMENT EXPERIENCE FOR NON-UNIFORMED MALES



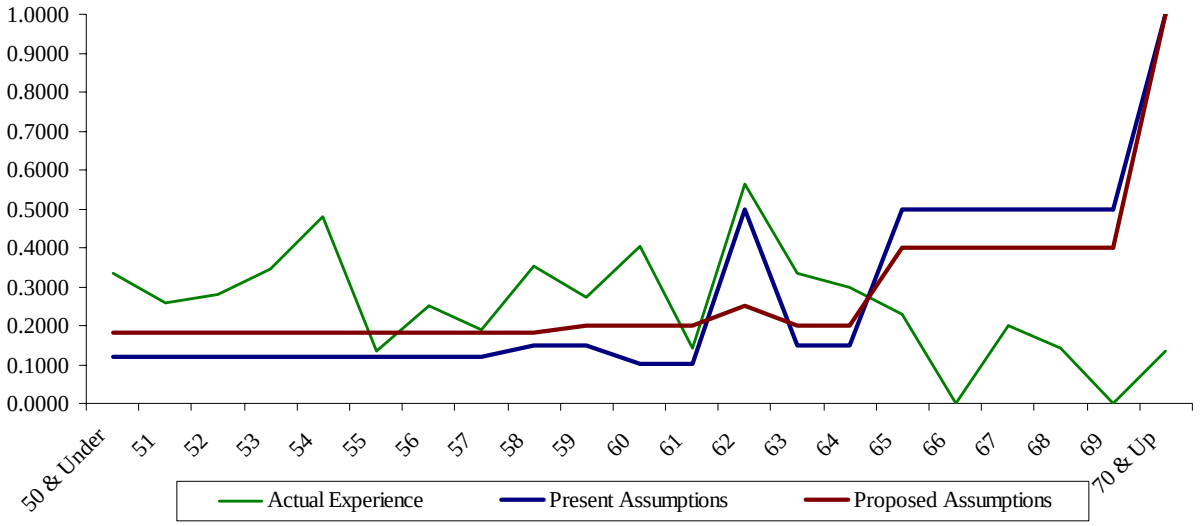
NON-UNIFORMED FEMALES
NORMAL RETIREMENT EXPERIENCE

There were 125 age and service unreduced retirements and 429 life years of exposure (exposure includes active members eligible for unreduced retirement) in the female retirement investigation.

SUMMARY OF NON-UNIFORMED FEMALES AGE & SERVICE UNREDUCED RETIREMENT EXPERIENCE

Age	Life Years Exposure	Number of Retirements			Retirement Rates		
		Actual Experience	Expected			Expected	
			Present	Proposed	Actual	Present	Proposed
50 & Under	30	10	4	5	0.3333	0.1200	0.1800
51	35	9	4	6	0.2571	0.1200	0.1800
52	32	9	4	6	0.2813	0.1200	0.1800
53	26	9	3	5	0.3462	0.1200	0.1800
54	25	12	3	5	0.4800	0.1200	0.1800
55	15	2	2	3	0.1333	0.1200	0.1800
56	20	5	2	4	0.2500	0.1200	0.1800
57	16	3	2	3	0.1875	0.1200	0.1800
58	17	6	3	3	0.3529	0.1500	0.1800
59	22	6	3	4	0.2727	0.1500	0.2000
60	37	15	4	7	0.4054	0.1000	0.2000
61	28	4	3	6	0.1429	0.1000	0.2000
62	32	18	16	8	0.5625	0.5000	0.2500
63	15	5	2	3	0.3333	0.1500	0.2000
64	10	3	2	2	0.3000	0.1500	0.2000
65	13	3	7	5	0.2308	0.5000	0.4000
66	11	0	6	4	0.0000	0.5000	0.4000
67	10	2	5	4	0.2000	0.5000	0.4000
68	7	1	4	3	0.1429	0.5000	0.4000
69	6	0	3	2	0.0000	0.5000	0.4000
70 & Up	22	3	22	22	0.1364	1.0000	1.0000
Total	**429**	**125**	**104**	**110**	**0.2914**	**0.2424**	**0.2564**

RATES OF UNREDUCED RETIREMENT EXPERIENCE FOR NON-UNIFORMED FEMALES



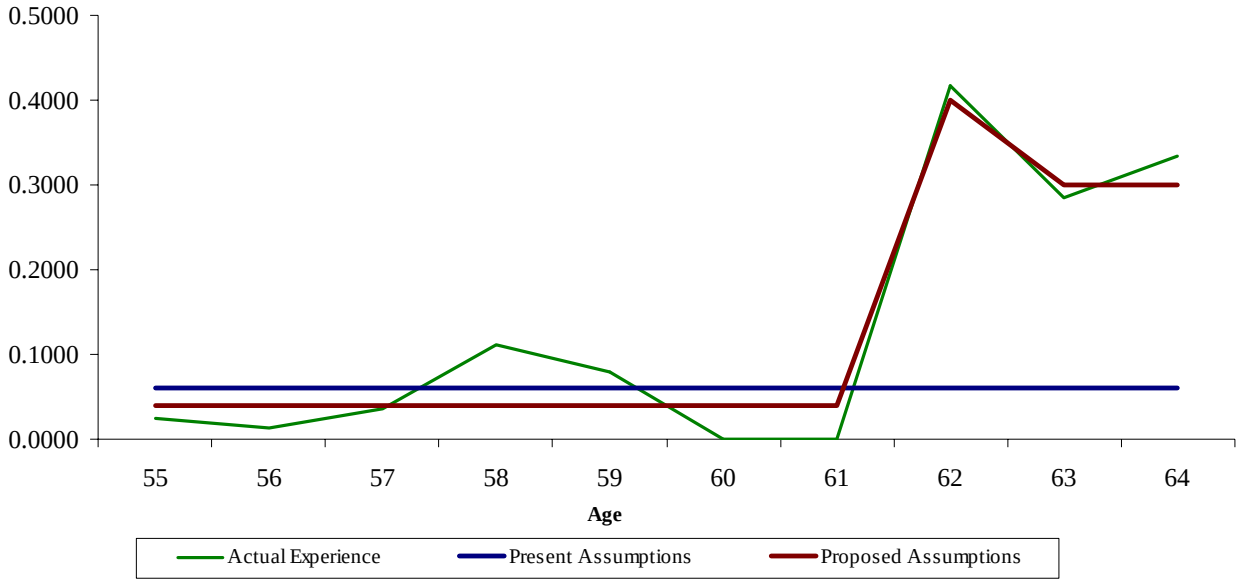
NON-UNIFORMED FEMALES
EARLY RETIREMENT EXPERIENCE

There were 22 age and service reduced retirements and 346 life years of exposure (exposure includes active members eligible for reduced retirement) in the female retirement investigation.

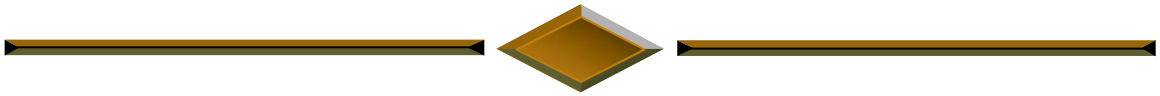
SUMMARY OF NON-UNIFORMED FEMALES AGE & SERVICE REDUCED RETIREMENT EXPERIENCE

Age	Life Years Exposure	Number of Retirements			Retirement Rates		
		Actual Experience	Expected			Expected	
			Present	Proposed	Actual	Present	Proposed
55	84	2	5.0	3.4	0.0238	0.0600	0.0400
56	75	1	4.5	3.0	0.0133	0.0600	0.0400
57	55	2	3.3	2.2	0.0364	0.0600	0.0400
58	45	5	2.7	1.8	0.1111	0.0600	0.0400
59	38	3	2.3	1.5	0.0789	0.0600	0.0400
60	11	0	0.7	0.4	0.0000	0.0600	0.0400
61	13	0	0.8	0.5	0.0000	0.0600	0.0400
62	12	5	0.7	4.8	0.4167	0.0600	0.4000
63	7	2	0.4	2.1	0.2857	0.0600	0.3000
64	6	2	0.4	2.0	0.3333	0.0600	0.3000
Total	**346**	**22**	**20.8**	**21.7**	**0.0636**	**0.0600**	**0.0627**

RATES OF REDUCED RETIREMENT EXPERIENCE FOR NON-UNIFORMED FEMALES



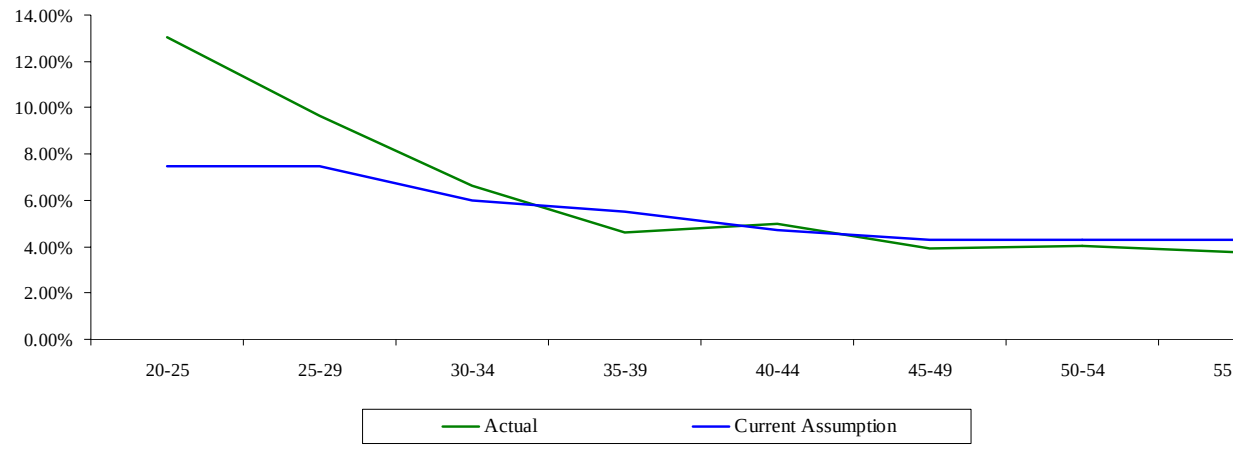
PAY INCREASES
MERIT & LONGEVITY PORTION



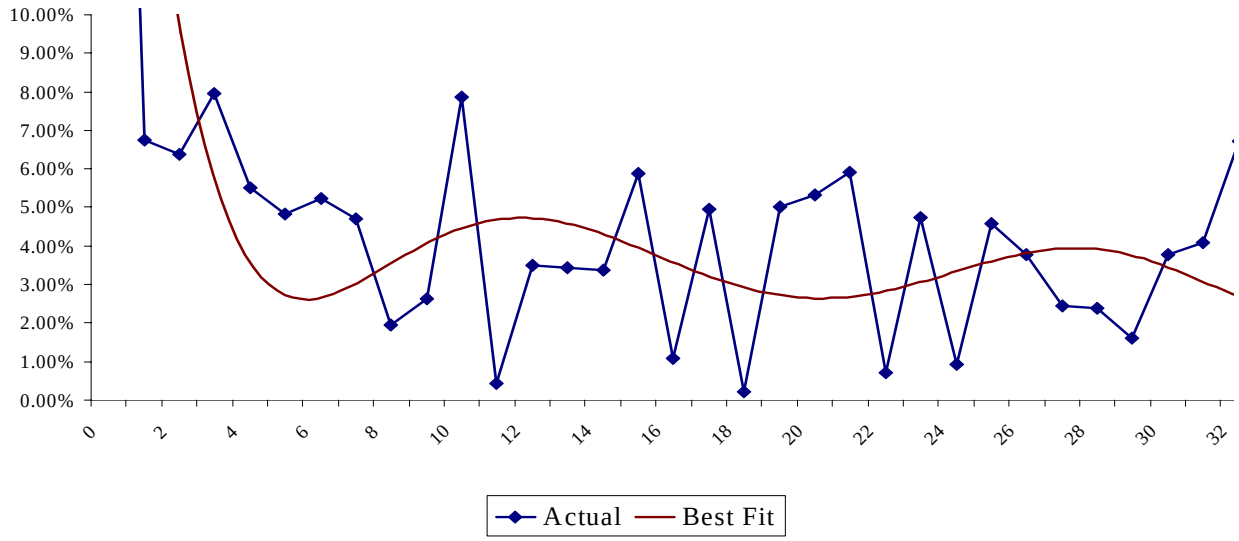
UNIFORMED MEMBERS
GROSS PAY INCREASE ASSUMPTIONS

The graphs shown below illustrate gross rates of salary increases for Uniformed Members, according to age and service respectively. They demonstrate that rates of salary increases are highly correlated with age. New rates (merit and longevity portion only) are shown on the following page.

GROSS SALARY INCREASES – CORRELATION BY AGE



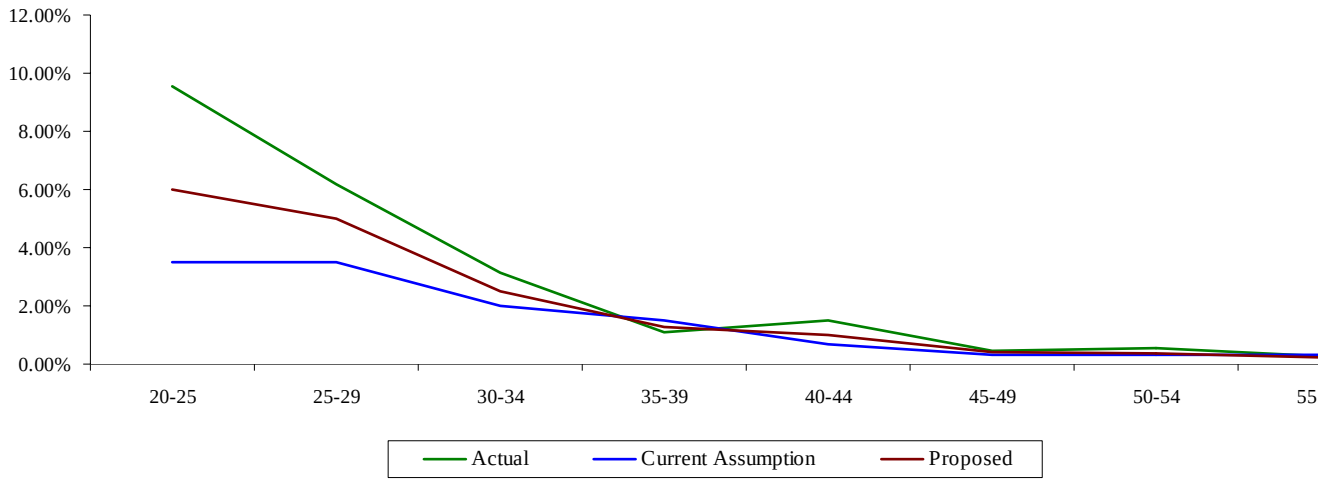
GROSS SALARY INCREASES – CORRELATION BY SERVICE



UNIFORMED MEMBERS
MERIT & LONGEVITY PAY INCREASE ASSUMPTIONS

Age Group Beginning of Year	Number	Actual	Expected	Proposed	Age Group Beginning of Year
20-25	151	9.55%	3.50 %	6.00 %	20-25
25-29	843	6.18%	3.50 %	5.00 %	25-29
30-34	1,330	3.15%	2.00 %	2.50 %	30-34
35-39	935	1.09%	1.50 %	1.25 %	35-39
40-44	662	1.51%	0.70 %	1.00 %	40-44
45-49	656	0.43%	0.30 %	0.40 %	45-49
50-54	406	0.55%	0.30 %	0.35 %	50-54
55-59	88	0.25%	0.30 %	0.25 %	55-59
Total	**5,071**				**Total**

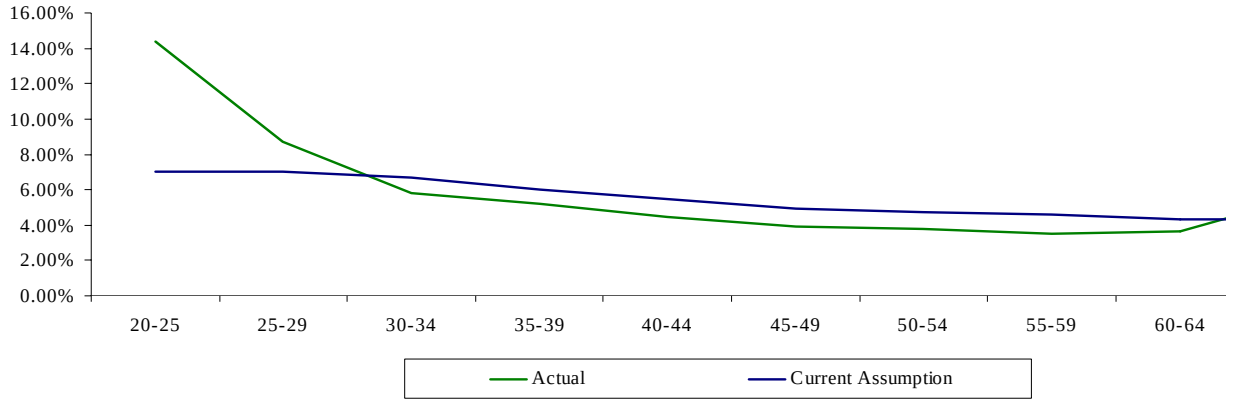
RATES OF SALARY INCREASES



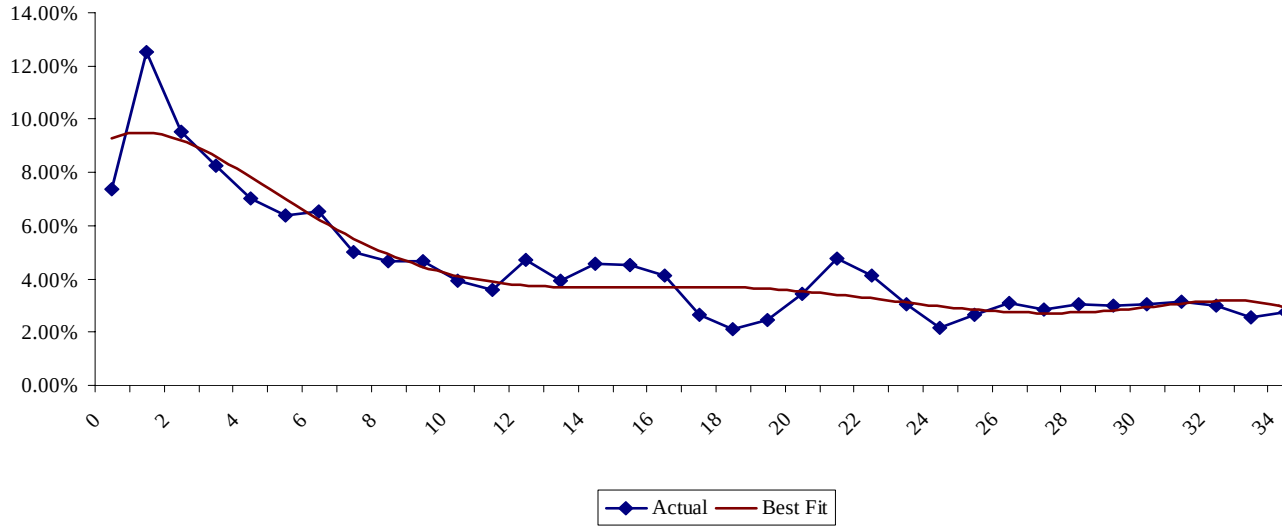
NON-UNIFORMED MEMBERS
GROSS PAY INCREASE ASSUMPTIONS

The graphs shown below illustrate rates of gross salary increases for Non-Uniformed Members, according to age and service respectively. They demonstrate that rates of salary increases are highly correlated with age. New rates (merit and longevity portion only) are shown on the following page.

GROSS SALARY INCREASES – CORRELATION BY AGE



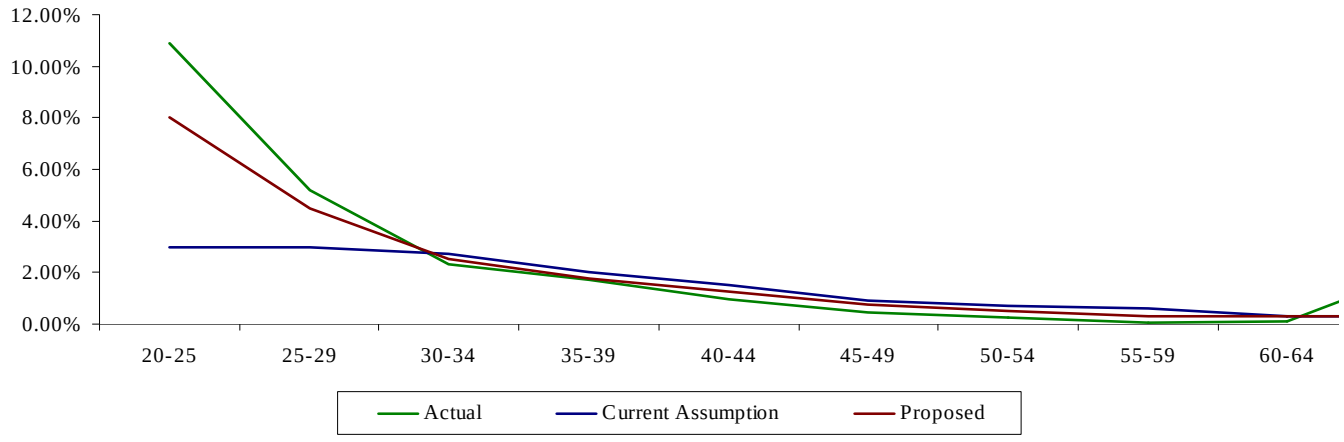
GROSS SALARY INCREASES – CORRELATION BY SERVICE



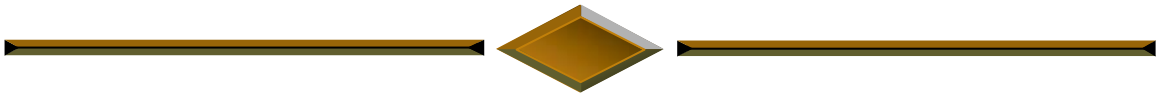
NON-UNIFORMED MEMBERS
MERIT & LONGEVITY PAY INCREASE ASSUMPTIONS

Age Group Beginning of Year	Number	Actual	Expected	Proposed	Age Group Beginning of Year
20-25	1,379	10.87%	3.00 %	8.00 %	20-25
25-29	3,085	5.19%	3.00 %	4.50 %	25-29
30-34	4,369	2.31%	2.70 %	2.50 %	30-34
35-39	5,588	1.71%	2.00 %	1.75 %	35-39
40-44	6,786	0.96%	1.50 %	1.25 %	40-44
45-49	6,246	0.44%	0.90 %	0.75 %	45-49
50-54	4,670	0.25%	0.70 %	0.50 %	50-54
55-59	2,599	0.04%	0.60 %	0.30 %	55-59
60-64	843	0.12%	0.30 %	0.30 %	60-64
65 & Over	125	2.17%	0.30 %	0.30 %	65 & Over
Total	**35,690**				**Total**

RATES OF SALARY INCREASES



MORTALITY EXPERIENCE



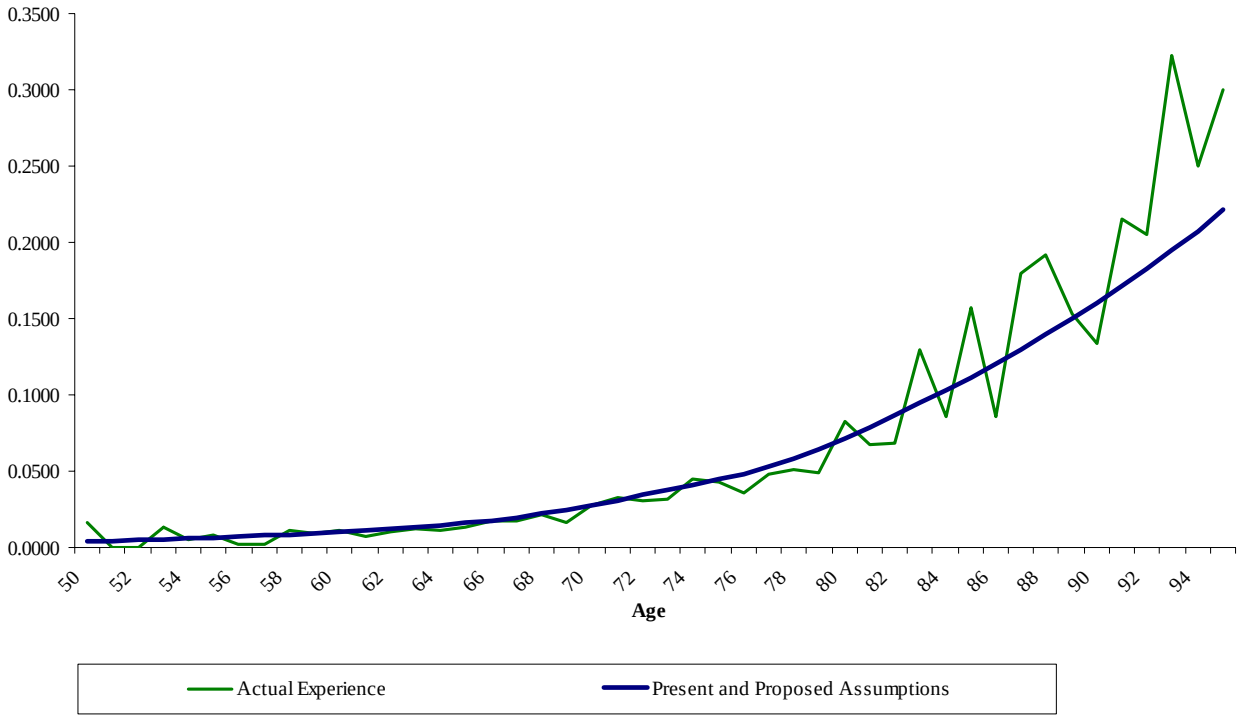
MALE RETIRED-LIFE MORTALITY EXPERIENCE (NORMAL RETIREMENT, ORIGINAL ANNUITANTS ONLY)

There were 645 retired member deaths reported for the 5-year period and 20,837 life years of exposure included in the male retired-life mortality investigation. There were fewer deaths than expected among retired males.

SUMMARY OF MALE RETIRED LIVES MORTALITY EXPERIENCE

Age	Life Years Exposure	Post - Retirement Death			Post - Retirement Death Rates		
		Actual Experience	Expected			Expected	
			Present	Proposed	Actual	Present	Proposed
50-54	1,107	7	5.0	5.0	0.0063	0.0049	0.0049
55-59	2,930	19	22.0	22.0	0.0065	0.0077	0.0077
60-64	4,023	42	48.0	48.0	0.0104	0.0120	0.0120
65-69	4,427	75	87.0	87.0	0.0169	0.0197	0.0197
70-74	3,547	116	121.0	121.0	0.0327	0.0342	0.0342
75-79	2,422	109	128.0	128.0	0.0450	0.0529	0.0529
80-84	1,498	127	130.0	130.0	0.0848	0.0865	0.0865
85-89	642	96	83.0	83.0	0.1495	0.1299	0.1299
90-94	201	42	37.0	37.0	0.2090	0.1829	0.1829
95 & Up	40	12	10.0	10.0	0.3000	0.2532	0.2532
Totals	**20,837**	**645**	**671.0**	**671.0**	**0.0310**	**0.0322**	**0.0322**

RATES OF MALE RETIRED LIVES MORTALITY EXPERIENCE



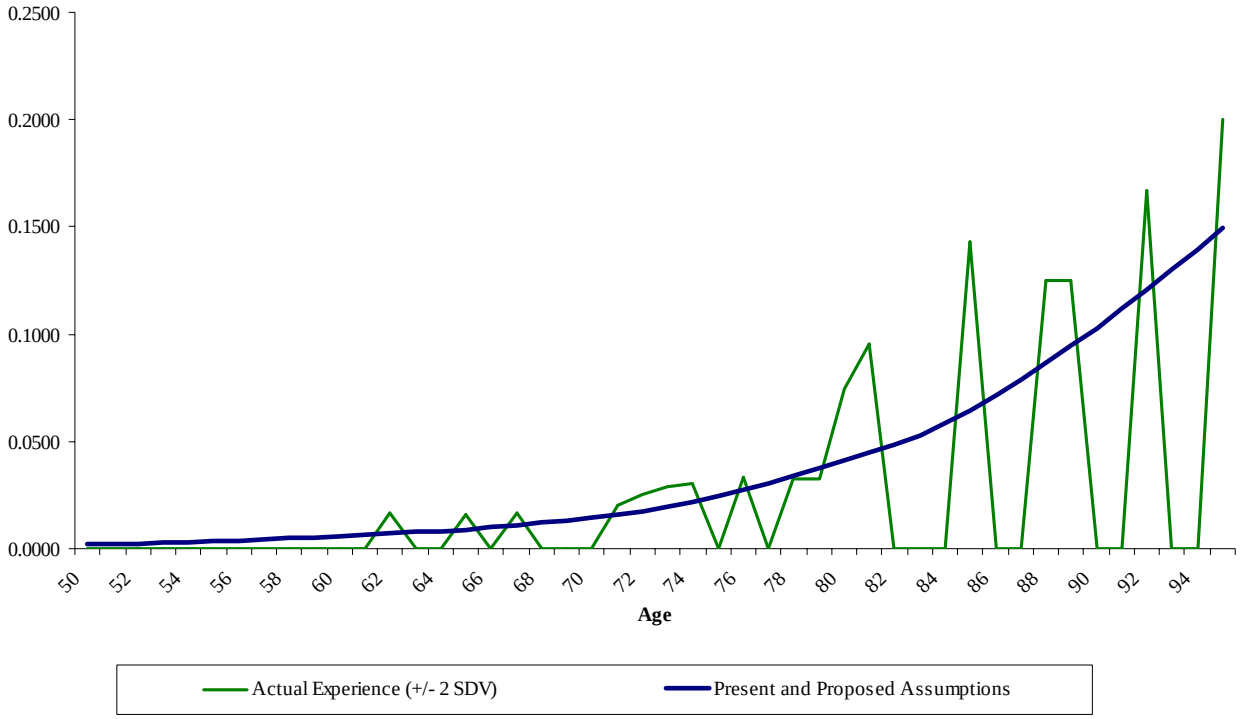
FEMALE RETIRED-LIFE MORTALITY EXPERIENCE (NORMAL RETIREMENT, ORIGINAL ANNUITANTS ONLY)

There were 19 retired member deaths reported for the 5-year period and 1,356 life years of exposure included in the female retired-life mortality investigation. There were fewer deaths than expected among retired females.

SUMMARY OF FEMALE RETIRED LIVES MORTALITY EXPERIENCE

Age	Life Years Exposure	Post - Retirement Death			Post - Retirement Death Rates		
		Actual Experience	Expected			Expected	
			Present	Proposed	Actual	Present	Proposed
50-54	107	0	0.0	0.0	0.0000	0.0024	0.0024
55-59	163	0	1.0	1.0	0.0000	0.0044	0.0044
60-64	292	1	2.0	2.0	0.0034	0.0071	0.0071
65-69	290	2	3.0	3.0	0.0069	0.0109	0.0109
70-74	210	4	4.0	4.0	0.0190	0.0177	0.0177
75-79	153	3	5.0	5.0	0.0196	0.0307	0.0307
80-84	80	4	4.0	4.0	0.0500	0.0484	0.0484
85-89	37	3	3.0	3.0	0.0811	0.0787	0.0787
90-94	19	1	2.0	2.0	0.0526	0.1206	0.1206
95 & Up	5	1	1.0	1.0	0.2000	0.1713	0.1713
Totals	**1,356**	**19**	**25.0**	**25.0**	**0.0140**	**0.0184**	**0.0184**

RATES OF FEMALE RETIRED LIVES MORTALITY EXPERIENCE



MALE DEATH-IN-SERVICE EXPERIENCE

There were 43 active male deaths reported for the 5-year period and 29,818 life years of exposure included in the male active mortality investigation.

MALE DEATHS

Age	Life Years Exposure	Pre - Retirement Death			Pre - Retirement Death Rates		
		Actual Experience	Expected			Expected	
			Present	Proposed	Actual	Present	Proposed
Under 30	2,337	2	1.0	1.0	0.0009	0.0003	0.0003
30-34	3,888	3	1.0	1.0	0.0008	0.0004	0.0004
35-39	4,505	1	2.0	2.0	0.0002	0.0005	0.0005
40-44	5,389	6	4.0	4.0	0.0011	0.0008	0.0008
45-49	5,250	6	8.0	8.0	0.0011	0.0016	0.0016
50-54	4,623	12	12.0	12.0	0.0026	0.0027	0.0027
55-59	2,568	5	11.0	11.0	0.0019	0.0042	0.0042
60-64	1,136	5	7.0	7.0	0.0044	0.0066	0.0066
65-69	119	1	1.0	1.0	0.0084	0.0110	0.0110
70-74	1	-	0.0	0.0	0.0000	0.0188	0.0188
75-79	1	1	0.0	0.0	1.0000	0.0292	0.0292
80-84	1	1	0.0	0.0	1.0000	0.0472	0.0472
85-89	-	-	0.0	0.0	0.0000	0.0698	0.0698
90& Up	-	-	0.0	0.0	0.0000	0.0974	0.0974
Totals	**29,818**	**43**	**47.0**	**47.0**	**0.0014**	**0.0016**	**0.0016**

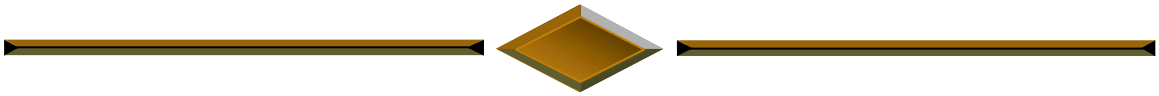
FEMALE DEATH-IN-SERVICE EXPERIENCE

There were no active female deaths reported for the 5-year period and 7,727 life years of exposure included in the female active mortality investigation.

FEMALE DEATHS

Age	Life Years Exposure	Pre - Retirement Death			Pre - Retirement Death Rates		
		Actual Experience	Expected			Expected	
			Present	Proposed	Actual	Present	Proposed
20-24	82	-	0.0	0.0	0.0000	0.0002	0.0002
25-29	559	-	0.0	0.0	0.0000	0.0002	0.0002
30-34	995	-	0.0	0.0	0.0000	0.0003	0.0003
35-39	1,352	-	1.0	1.0	0.0000	0.0004	0.0004
40-44	1,579	-	1.0	1.0	0.0000	0.0005	0.0005
45-49	1,348	-	1.0	1.0	0.0000	0.0008	0.0008
50-54	1,007	-	2.0	2.0	0.0000	0.0016	0.0016
55-59	531	-	1.0	1.0	0.0000	0.0027	0.0027
60-64	225	-	1.0	1.0	0.0000	0.0042	0.0042
65-69	48	-	0.0	0.0	0.0000	0.0066	0.0066
70-74	1	-	0.0	0.0	0.0000	0.0110	0.0110
75-79	-	-	0.0	0.0	0.0000	0.0188	0.0188
80-84	-	-	0.0	0.0	0.0000	0.0292	0.0292
85-89	-	-	0.0	0.0	0.0000	0.0472	0.0472
90& Up	-	-	0.0	0.0	0.0000	0.0698	0.0698
Totals	**7,727**	**0**	**7.0**	**7.0**	**0.0000**	**0.0009**	**0.0009**

COMPLETE LISTS OF PROPOSED DECREMENT ASSUMPTIONS



ACTUARIAL ASSUMPTIONS
BASED ON 1999-2004 EXPERIENCE STUDY
SELECT AND ULTIMATE WITHDRAWAL

		% of Active Participants Withdrawing			
		Uniformed Members		Non-Uniformed Members	
Age	Service	Male	Female	Male	Female
	0-1	8.0%	8.0%	25.0%	18.0%
	1-2	6.0%	6.0%	12.0%	11.0%
	2-3	4.5%	4.5%	7.0%	9.0%
	3-4	3.0%	3.0%	6.0%	7.0%
	4-5	2.0%	2.0%	5.0%	6.0%
30	5 & Up	3.8%	3.8%	3.8%	5.6%
31		3.5%	3.5%	3.5%	5.4%
32		3.3%	3.3%	3.4%	5.3%
33		2.9%	2.9%	3.2%	5.1%
34		2.6%	2.6%	3.0%	5.0%
35		2.2%	2.2%	2.9%	4.8%
36		1.9%	1.9%	2.7%	4.7%
37		1.5%	1.5%	2.5%	4.5%
38		1.4%	1.4%	2.3%	4.3%
39		1.3%	1.3%	2.1%	4.0%
40		1.2%	1.2%	2.0%	3.8%
41		1.1%	1.1%	1.8%	3.5%
42		1.0%	1.0%	1.6%	3.3%
43		0.9%	0.9%	1.5%	3.2%
44		0.9%	0.9%	1.4%	3.2%
45		0.8%	0.8%	1.3%	3.1%
46		0.8%	0.8%	1.2%	3.1%
47		0.7%	0.7%	1.1%	3.0%
48		0.6%	0.6%	1.1%	3.0%
49		0.5%	0.5%	1.0%	3.0%
50		0.5%	0.5%	1.0%	3.0%
51		0.4%	0.4%	0.9%	3.0%
52		0.3%	0.3%	0.9%	3.0%
53		0.3%	0.3%	0.8%	2.5%
54		0.2%	0.2%	0.7%	2.0%
55		0.2%	0.2%	0.7%	1.5%
56		0.1%	0.1%	0.6%	1.0%
57		0.1%	0.1%	0.5%	0.5%
58		0.1%	0.1%	0.4%	0.5%
59		0.1%	0.1%	0.3%	0.5%
60		0.1%	0.1%	0.2%	0.5%
Ref		13	13	353	352
		659	659	660	661

ACTUARIAL ASSUMPTIONS
BASED ON 1999-2004 EXPERIENCE STUDY
DISABILITY RATES

	% of Active Participants Becoming Disabled			
	Uniformed Members		Non-Uniformed Members	
Age	Male	Female	Male	Female
20	0.02%	0.02%	0.01%	0.05%
21	0.02%	0.02%	0.01%	0.05%
22	0.02%	0.02%	0.01%	0.05%
23	0.02%	0.02%	0.01%	0.05%
24	0.02%	0.02%	0.01%	0.05%
25	0.03%	0.03%	0.01%	0.06%
26	0.03%	0.03%	0.01%	0.06%
27	0.03%	0.03%	0.01%	0.06%
28	0.03%	0.03%	0.01%	0.06%
29	0.03%	0.03%	0.01%	0.07%
30	0.03%	0.03%	0.01%	0.07%
31	0.03%	0.03%	0.02%	0.08%
32	0.04%	0.04%	0.03%	0.08%
33	0.04%	0.04%	0.04%	0.09%
34	0.04%	0.04%	0.05%	0.10%
35	0.04%	0.04%	0.06%	0.10%
36	0.05%	0.05%	0.07%	0.11%
37	0.05%	0.05%	0.07%	0.12%
38	0.05%	0.05%	0.08%	0.13%
39	0.05%	0.05%	0.08%	0.15%
40	0.06%	0.06%	0.09%	0.16%
41	0.06%	0.06%	0.11%	0.18%
42	0.07%	0.07%	0.14%	0.20%
43	0.07%	0.07%	0.16%	0.23%
44	0.08%	0.08%	0.19%	0.26%
45	0.09%	0.09%	0.21%	0.29%
46	0.10%	0.10%	0.24%	0.32%
47	0.11%	0.11%	0.27%	0.35%
48	0.13%	0.13%	0.30%	0.38%
49	0.14%	0.14%	0.33%	0.41%
50	0.15%	0.15%	0.36%	0.45%
51	0.17%	0.17%	0.42%	0.50%
52	0.19%	0.19%	0.48%	0.58%
53	0.22%	0.22%	0.54%	0.69%
54	0.25%	0.25%	0.60%	0.82%
55	0.00%	0.00%	0.66%	0.54%
56	0.00%	0.00%	0.66%	0.67%
57	0.00%	0.00%	0.66%	0.83%
58	0.00%	0.00%	0.66%	0.99%
59	0.00%	0.00%	0.66%	1.15%
60	0.00%	0.00%	0.00%	0.00%
Ref	228	228	226	227
Multplier	60%	60%	60%	85%

ACTUARIAL ASSUMPTIONS
BASED ON 1999-2004 EXPERIENCE STUDY

SALARY SCALE – AGE BASED RATES

Age	% Merit Increases in Salaries Next Year	
	Uniformed Members	Non-Uniformed Members
20	6.0%	8.0%
21	6.0%	8.0%
22	6.0%	8.0%
23	5.8%	7.3%
24	5.6%	6.5%
25	5.4%	5.7%
26	5.2%	4.7%
27	5.0%	4.5%
28	4.5%	4.1%
29	4.0%	3.7%
30	3.5%	3.3%
31	3.0%	2.9%
32	2.5%	2.5%
33	2.3%	2.3%
34	2.0%	2.2%
35	1.8%	2.1%
36	1.5%	1.9%
37	1.3%	1.8%
38	1.2%	1.6%
39	1.2%	1.5%
40	1.1%	1.4%
41	1.0%	1.4%
42	1.0%	1.3%
43	0.9%	1.2%
44	0.8%	1.0%
45	0.6%	0.9%
46	0.5%	0.9%
47	0.4%	0.7%
48	0.4%	0.7%
49	0.4%	0.7%
50	0.4%	0.6%
51	0.4%	0.5%
52	0.4%	0.5%
53	0.3%	0.5%
54	0.3%	0.4%
55	0.3%	0.4%
56	0.3%	0.3%
57	0.2%	0.3%
58	0.0%	0.3%
59	0.0%	0.3%
60	0.0%	0.3%
61	0.0%	0.3%
62	0.0%	0.3%
63	0.0%	0.3%
64	0.0%	0.3%
65	0.0%	0.3%
66	0.0%	0.3%
67	0.0%	0.3%
68	0.0%	0.3%
69	0.0%	0.3%
70	0.0%	0.3%
Ref	162	161

ACTUARIAL ASSUMPTIONS
BASED ON 1999-2004 EXPERIENCE STUDY
NORMAL RETIREMENT PATTERN

	% of Active Participants Retiring			
	Uniformed Members		Non-Uniformed Members	
Age	Male	Female	Male	Female
50	50%	50%	18%	18%
51	25%	25%	18%	18%
52	20%	20%	18%	18%
53	20%	20%	18%	18%
54	20%	20%	18%	18%
55	25%	25%	18%	18%
56	30%	30%	18%	18%
57	35%	35%	18%	18%
58	35%	35%	18%	18%
59	35%	35%	18%	20%
60	100%	100%	18%	20%
61	100%	100%	18%	20%
62	100%	100%	50%	25%
63	100%	100%	40%	20%
64	100%	100%	30%	20%
65	100%	100%	45%	40%
66	100%	100%	40%	40%
67	100%	100%	35%	40%
68	100%	100%	35%	40%
69	100%	100%	35%	40%
70	100%	100%	100%	100%
Ref	475	475	888	909

ACTUARIAL ASSUMPTIONS
BASED ON 1999-2004 EXPERIENCE STUDY
EARLY RETIREMENT PATTERN

	% of Active Participants Retiring	
	Non-Uniformed Members	
Age	Male	Female
55	4%	4%
56	4%	4%
57	4%	4%
58	4%	4%
59	4%	4%
60	4%	4%
61	4%	4%
62	35%	40%
63	4%	30%
64	4%	30%
Ref	910	925

ACTUARIAL ASSUMPTIONS
BASED ON 1999-2004 EXPERIENCE STUDY
RETIRED LIVES MORTALITY RATES

Age	% Dying Next Year	
	Male	Female
20	0.0402%	0.0342%
21	0.0416%	0.0349%
22	0.0432%	0.0358%
23	0.0450%	0.0367%
24	0.0468%	0.0378%
25	0.0489%	0.0390%
26	0.0512%	0.0402%
27	0.0538%	0.0416%
28	0.0566%	0.0432%
29	0.0598%	0.0450%
30	0.0632%	0.0468%
31	0.0670%	0.0489%
32	0.0712%	0.0512%
33	0.0758%	0.0538%
34	0.0809%	0.0566%
35	0.0866%	0.0598%
36	0.0929%	0.0632%
37	0.0997%	0.0670%
38	0.1072%	0.0712%
39	0.1156%	0.0758%
40	0.1249%	0.0809%
41	0.1352%	0.0866%
42	0.1481%	0.0929%
43	0.1655%	0.0997%
44	0.1871%	0.1072%
45	0.2126%	0.1156%
46	0.2419%	0.1249%
47	0.2746%	0.1352%
48	0.3107%	0.1481%
49	0.3499%	0.1655%
50	0.3923%	0.1871%
51	0.4374%	0.2126%
52	0.4856%	0.2419%
53	0.5363%	0.2746%
54	0.5899%	0.3107%
55	0.6461%	0.3499%
56	0.7051%	0.3923%
57	0.7666%	0.4374%
58	0.8309%	0.4856%
59	0.9013%	0.5363%
Ref	152 x 100%	154 x 100%
Set Back	-1	-2

Age	% Dying Next Year	
	Male	Female
60	0.9869%	0.5899%
61	1.0858%	0.6461%
62	1.1952%	0.7051%
63	1.3130%	0.7666%
64	1.4413%	0.8309%
65	1.5926%	0.9013%
66	1.7700%	0.9869%
67	1.9741%	1.0858%
68	2.2037%	1.1952%
69	2.4514%	1.3130%
70	2.7400%	1.4413%
71	3.0680%	1.5926%
72	3.4194%	1.7700%
73	3.7677%	1.9741%
74	4.1064%	2.2037%
75	4.4550%	2.4514%
76	4.8373%	2.7400%
77	5.2857%	3.0680%
78	5.8349%	3.4194%
79	6.4629%	3.7677%
80	7.1362%	4.1064%
81	7.8749%	4.4550%
82	8.6469%	4.8373%
83	9.4487%	5.2857%
84	10.2932%	5.8349%
85	11.1657%	6.4629%
86	12.0641%	7.1362%
87	12.9938%	7.8749%
88	13.9513%	8.6469%
89	14.9547%	9.4487%
90	16.0121%	10.2932%
91	17.1309%	11.1657%
92	18.2905%	12.0641%
93	19.4779%	12.9938%
94	20.6895%	13.9513%
95	22.1338%	14.9547%
96	23.7003%	16.0121%
97	25.3249%	17.1309%
98	27.0904%	18.2905%
99	29.0163%	19.4779%

Age	% Dying Next Year	
	Male	Female
100	30.9125%	20.6895%
101	32.9825%	22.1338%
102	35.2455%	23.7003%
103	37.7220%	25.3249%
104	40.6205%	27.0904%
105	44.1497%	29.0163%
106	48.5182%	30.9125%
107	53.9343%	32.9825%
108	60.6069%	35.2455%
109	68.7444%	37.7220%
110	78.5555%	40.6205%
111	99.9999%	44.1497%
112	100.0000%	48.5182%
113	100.0000%	53.9343%
114	100.0000%	60.6069%
115	100.0000%	68.7444%
116	100.0000%	78.5555%
117	100.0000%	99.9999%
118	100.0000%	100.0000%
119	100.0000%	100.0000%
120	100.0000%	100.0000%

ACTUARIAL ASSUMPTIONS
BASED ON 1999-2004 EXPERIENCE STUDY

DEATH-IN-SERVICE RATES

Age	% Dying Next Year	
	Male	Female
20	0.0208%	0.0179%
21	0.0216%	0.0184%
22	0.0225%	0.0189%
23	0.0234%	0.0195%
24	0.0244%	0.0201%
25	0.0256%	0.0208%
26	0.0269%	0.0216%
27	0.0283%	0.0225%
28	0.0299%	0.0234%
29	0.0316%	0.0244%
30	0.0335%	0.0256%
31	0.0356%	0.0269%
32	0.0379%	0.0283%
33	0.0404%	0.0299%
34	0.0433%	0.0316%
35	0.0464%	0.0335%
36	0.0499%	0.0356%
37	0.0536%	0.0379%
38	0.0578%	0.0404%
39	0.0624%	0.0433%
40	0.0676%	0.0464%
41	0.0740%	0.0499%
42	0.0828%	0.0536%
43	0.0936%	0.0578%
44	0.1063%	0.0624%
45	0.1210%	0.0676%
46	0.1373%	0.0740%
47	0.1553%	0.0828%
48	0.1750%	0.0936%
49	0.1961%	0.1063%
50	0.2187%	0.1210%
51	0.2428%	0.1373%
52	0.2682%	0.1553%
53	0.2949%	0.1750%
54	0.3231%	0.1961%
55	0.3525%	0.2187%
56	0.3833%	0.2428%
57	0.4155%	0.2682%
58	0.4506%	0.2949%
59	0.4934%	0.3231%
Ref	152 x 50%	154 x 50%

Age	% Dying Next Year	
	Male	Female
60	0.5429%	0.3525%
61	0.5976%	0.3833%
62	0.6565%	0.4155%
63	0.7207%	0.4506%
64	0.7963%	0.4934%
65	0.8850%	0.5429%
66	0.9871%	0.5976%
67	1.1018%	0.6565%
68	1.2257%	0.7207%
69	1.3700%	0.7963%
70	1.5340%	0.8850%
71	1.7097%	0.9871%
72	1.8839%	1.1018%
73	2.0532%	1.2257%
74	2.2275%	1.3700%
75	2.4186%	1.5340%
76	2.6429%	1.7097%
77	2.9174%	1.8839%
78	3.2315%	2.0532%
79	3.5681%	2.2275%
80	3.9375%	2.4186%
81	4.3235%	2.6429%
82	4.7243%	2.9174%
83	5.1466%	3.2315%
84	5.5829%	3.5681%
85	6.0321%	3.9375%
86	6.4969%	4.3235%
87	6.9757%	4.7243%
88	7.4773%	5.1466%
89	8.0060%	5.5829%
90	8.5654%	6.0321%
91	9.1453%	6.4969%
92	9.7389%	6.9757%
93	10.3447%	7.4773%
94	11.0669%	8.0060%
95	11.8501%	8.5654%
96	12.6624%	9.1453%
97	13.5452%	9.7389%
98	14.5082%	10.3447%
99	15.4563%	11.0669%

Age	% Dying Next Year	
	Male	Female
100	16.4913%	11.8501%
101	17.6227%	12.6624%
102	18.8610%	13.5452%
103	20.3102%	14.5082%
104	22.0748%	15.4563%
105	24.2591%	16.4913%
106	26.9671%	17.6227%
107	30.3035%	18.8610%
108	34.3722%	20.3102%
109	39.2778%	22.0748%
110	49.9999%	24.2591%
111	50.0000%	26.9671%
112	50.0000%	30.3035%
113	50.0000%	34.3722%
114	50.0000%	39.2778%
115	50.0000%	49.9999%
116	50.0000%	50.0000%
117	50.0000%	50.0000%
118	50.0000%	50.0000%
119	50.0000%	50.0000%
120	100.0000%	100.0000%

GABRIEL, ROEDER, SMITH & COMPANY
Consultants & Actuaries

One Towne Square ● Suite 800 ● Southfield, Michigan 48076 ● 248-799-9000 ● 800-521-0498 ● fax 248-799-9020

March 29, 2005

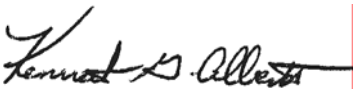
Mr. Norm Robinson
Missouri Department of Transportation
and Highway Patrol Employees' Retirement System
1913 Williams Street
Jefferson City, MO 65109

Re: 1999 – 2004 MPERS Experience Study

Dear Norm:

Enclosed are 25 spiral bound copies of the report and one 3-hole punched copy of the 1999 – 2004 MPERS Experience Study.

Sincerely,



Kenneth G. Alberts

KGA/lr
Enclosures

cc: Brian Murphy